The *Plecia* of the Pacific and Southeast Asia (Bibionidae–Diptera)[1]

D. Elmo Hardy[2]

In the Pacific region the family Bibionidae is almost restricted to the southwest portion of the hemisphere (Melanesia, Australia, and Malaysia) and—except for one species (*Plecia palauensis* Hardy) from the eastern Caroline Islands—the group is completely lacking in all of Micronesia and Polynesia. Beyond a line drawn north and east of the Philippine Islands, New Guinea, Solomon Islands, and New Caledonia, bibionids become rather abundant, especially species of the genus *Plecia*. The species of the southwest Pacific show relationships with those of Indonesia and Malaya and southeast Asia. The present study includes Ceylon, Burma, Thailand, Indochina, and Malaya as well as the Pacific region. Forty-six species and one subspecies are now known from this portion of the world.

I have accumulated these data over a period of many years and have studied all of the available specimens from these areas. I am much indebted to the following entomologists for the loan of material from various institutions: Dr. M. A. Lieftinck and Dr. H. Boschma, Rijksmuseum van Natuurlijke Historie, Leiden, Holland; Dr. A. M. R. Wegner, Museum Zoologicum Bogoriense, Bogor, Indonesia; Dr. G. Kruseman, Zoologisch Museum, Amsterdam; Paul Freeman, British Museum (Natural History), London; Dr. J. L. Gressitt, Bernice P. Bishop Museum, Honolulu, Hawaii; Dr. Alan Stone, U. S. National Museum; Dr. Max Beier, Naturhistorisches Museum, Wien; and Dr. Delfa Guiglia, Museo Civico de Storia Naturale, Genoa.

[1] Published with the approval of the Director of the Hawaii Agricultural Experiment Station as Technical Paper No. 386. Manuscript received February 4, 1957.

[2] University of Hawaii, College of Agriculture, Hawaii Agricultural Experiment Station, Honolulu, Hawaii.

Key to Plecia of the Pacific region and southeast Asia, based upon males

1. Ocelli present, situated on a raised triangle..... **Plecia (Plecia)** 2

   Ocelli and ocellar triangle lacking. Eyes of male joined on the front up to the top of the vertex. (New Guinea)..... **Plecia (Heteroplecia) visenda** Hardy

2. Thorax dark brown to black.....3

   Thorax usually predominantly rufous, in a few species the mesonotum is discolored brownish red but the furrows and sides are rufous.....15

3. Ninth tergum gently concave on hind margin, not cleft over one-third the length of the segment (Fig. 10*c*).....4

   Ninth tergum deeply cleft, the concavity extending nearly to the base of segment 5

4. Claspers bilobed, posterior median margin of ninth sternum without a sclerotized lobe (Fig. 10*a*). (Australia)..... .....**erebea** Skuse

   Claspers simple, posterior median margin of ninth sternum with a sharp-pointed lobe (Fig. 26*a*). (Java).**tenebrosa** n.sp.

5. Sides of mesonotum and scutellum dull red. Mesonotum with three black vittae or with front and median portions black 6

   Thorax entirely black.....7

6. Claspers well developed, extending well beyond apices of ninth sternum. Lobes of ninth tergum converging and each with a strong apical spine (Fig. 17*a*). (New Guinea) ..... **magnispina** n.sp.

   Claspers minute, lobes of sternum strongly developed, lobes of tergum diverging, not bearing an apical spine (Fig. 24). (Ceylon) ..... **rufilatera** Edwards

7. Posterior lateral margins of ninth sternum strongly lobate, the apices extend well beyond tips of claspers and near or beyond apices of ninth tergum **8**

   Ninth sternum rounded on posterior lateral margins, the slightly developed lobes do not extend over half the length of the claspers or the lobes of the ninth tergum. (Java) ..... **morosa** Edwards

8. Ninth sternum produced into a broad, flat-topped, heavily sclerotized lobe protruding from the median margin. (Philippine Islands) ..... **cana** Hardy

   Ninth sternum not developed as above. **9**

9. Ninth tergum expanded laterally, from lateral view it is equal or wider than sternum so that from side view the genitalia are wider than long (Fig. 7*b*). Ninth tergum divided into two plates by a very deep cleft, the plates are joined at bases only by a narrow sclerotized line; sides of cleft straight or slightly expanded in middle **10**

   Ninth tergum not expanded laterally, about one-half as wide as sternum and genitalia much longer than wide (in lateral view). Cleft of tergum not so deep and V- or U-shaped **11**

10. Lobes of ninth sternum comparatively broad, rounded at apices, serrated on inner apices, over two times wider than claspers (Fig. 7*a*). (Netherlands New Guinea) ..... **disjuncta** n.sp.

    Lobes of sternum slender, slightly curved and pointed at apices; beyond middle they are not as wide as the claspers (Fig. 19*d*). (Northeast New Guinea) ..... **monticola** n.sp.

11. Claspers small, rounded at apices, with a sharp-pointed subapical lobe on inner margin. Claspers extending scarcely one-third as far as lateral lobes of sternum (Fig. 14*a*). (Borneo) . **fumidula** Edwards

    Claspers of moderate size, not so shaped and extending nearly as far as lobes of sternum **12**

12. Claspers blunt and rounded at apex as seen from a direct ventral view (Fig. 29*a*). From a lateral view a pair of dorsally projected lobes are developed. Mesonotum subshining in the furrows. (Java) ..... **tristis** van der Wulp

    Claspers not as above, with no secondary lobes on dorsal surface. Mesonotum entirely opaque **13**

13. Claspers rounded or subacute at apices **14**
    Claspers square tipped. (Borneo) ..... **fumida** Edwards

14. Claspers strongly curved, with a capitate rounded apical lobe and the basal portion slightly hollowed out and expanded laterally. Sternum with a pair of moderately large submedian lobes. Antennae 9-segmented. (Indonesia) .... **furva** Hardy

    Claspers subacute, not capitate, basal portion not hollowed out and with inner basal margins joined by a narrow sclerotized bridge. Ninth sternum without submedian lobes. Antenna 8-segmented. (Caroline Islands) ... **palauensis** Hardy

15. Thorax dull red with 3 brownish red vittae extending down mesonotum. Pleura discolored with brown on upper portion. **16**

    At least mesonotum bright orange to rufous, sometimes with a brown to black spot on front margin **17**

16. Lobes of ninth tergum ending in a strong apical spine. Posterior lateral margins of ninth sternum developed into slender lobes (Fig. 17*a*). (New Guinea)..... **magnispina** n.sp.

    Lobes of tergum not bearing an apical spine. Posterior lateral margins of sternum not developed as above (Fig. 5). (New Guinea)..... **decora** Hardy

17. Thorax all rufous (except for a brown to black spot on upper portion of pleura in *sundaensis* Hardy)..... 18

    Pleura predominantly brown to black. 35

18. Ninth tergum and sternum fused on the sides and forming a capsule around the internal genital structures. The claspers and the structure of the sternum cannot be seen except in end view (Fig. 22*a*). (Philippine Islands).... **parva** Malloch

    Genital sclerites not fused. Claspers and other structures exposed..... 19

19. Ninth tergum not strongly produced at apices, not extending beyond sternum or tips of claspers..... 20

    Ninth tergum strongly lobate, extending two times the length of sternum (Fig. 11*b*). (Indonesia, Indian Ocean) (some specimens may run here)..... **forcipata** Osten Sacken

20. Ninth tergum gently concave on hind margin, the concavity extending not over one-half to base of segment (Fig. 16*c*). (Java)..... **lieftincki** n.sp.

    Ninth tergum deeply cleft, nearly to base of segment..... 21

21. Ninth sternum with a pair of submedian sharp-pointed lobes, equal in length to remainder of sternum (measured on a median line) and extending nearly to apices of claspers. Also a narrow-pointed median lobe present (Fig. 28*b*). Lateral margins of sternum not produced. (Wetter Island, Indonesia).... **tridens** n.sp.

    Not as above..... 22

22. Lateral lobes on hind margin of sternum narrow, strongly curved inward; median portion with a cleft which is expanded basally (Fig. 30*b*). (Malaya)..... **varians** Edwards

    Lateral lobes not curved as above and sometimes with a slightly expanded median cleft only in *subvarians* Walker. 23

23. Ninth sternum very broad and narrow, at least two times broader than long. Claspers joined at bases, equal in length or longer than ninth sternum, measured through median portion of sternum.. 24

    Ninth sternum as long as wide. Claspers much shorter than sternum..... 26

24. Claspers blunt, broadly rounded at apices (Fig. 8*b*). (Ceylon and India)..... **dispersa** n. name (for *thoracica* Guérin)

    Claspers narrowed apically..... 25

25. Posterior lateral margins of ninth sternum produced into pointed lobes. Posterior lateral margins of ninth tergum produced. Ocellar triangle tiny in male, the entire triangle is equal to only 3–4 eye facets. (East Indies).. **javensis** Edwards

    Posterior lateral margins of ninth sternum and ninth tergum not so produced (Fig. 1*a*, *c*). Ocellar triangle normal, each lateral facet equal to about 3 compound eye facets in length. (Australia, New Hebrides, Papua, Solomon Islands).... **amplipennis** Skuse

26. Lobes on posterior lateral margins of sternum slender stemmed, enlarged at apices. (Philippine Islands)..... **mayoensis** Hardy

    Lobes of sternum not capitate..... 27

27. Ninth sternum with a pair of closely placed lobes at middle of hind margin, separated by a narrow V-shaped cleft. Posterior lateral margins of sternum not lobate.....28

    If ninth sternum has median or submedian lobes on hind margin they are well spaced by a broad U-shaped cleft. Posterior lateral margins strongly lobate. 29

28. Median lobes of sternum very strong, claspers not visible from a ventral view (Fig. 2*a*). Ninth tergum with a broad U-shaped cleft (Fig. 2*c*). (Aru Islands)... .....**aruensis** Edwards

    Median lobes comparatively small, claspers extending strongly beyond hind margin of sternum (Fig. 3*a*). Ninth tergum with a narrow V-shaped cleft (Fig. 3*b*): (Philippine Islands)....**bakeri** Malloch

29. Claspers tiny, inconspicuous, and partly or completely fused with ninth sternum. Median portion of hind margin of ninth sternum produced into a broad heavily sclerotized capitate projection, either truncate at apex or terminating in a pair of blunt lobes and extending beyond apices of lateral lobes of sternum...30

    Claspers well developed, distinctly articulated with the sternum. No such development of a median lobe.....31

30. Median process of sternum truncate at apex. (Philippine Islands)..... .....**zamboanga** Hardy

    Median process developed into a pair of blunt lobes at apex (Fig. 13*b*). (Sumatra, Philippine Islands)..... .....**fulvicollis** (Fabricius)

31. Ninth sternum with a median moundlike lobe on hind margin.....32

    No median lobe on sternum.....33

32. Lobes on posterior lateral margins of ninth sternum rounded at apices, separated at bases by the width of the lobe at this point. No submedian lobes on sternum. Claspers truncate, pointed at outer apices (Fig. 21*a*). (Australia)..... .....**ornaticornis** Skuse

    Lateral lobes rather slender pointed, widely spaced, separated by four times their width at base; a pair of small submedian lobes present on hind margin. Claspers rounded at apices (Fig. 23). (Kei Island, Indonesia)..... .....**ruficornis** Edwards

33. Lateral lobes of sternum slender and elongate, extending about two times the length of claspers and more than two times longer than the submedian lobes on hind margin.....34

    Lateral lobes tapered to a point, extending scarcely beyond apices of claspers and submedian lobes. (Indonesia)..... .....**sundaensis** Hardy

34. Ninth sternum extending well beyond apices of tergum, so tergum is not plainly visible from direct ventral view. The submedian lobes of sternum rounded. Cleft in middle of hind margin of tergum narrow, about one-sixth the width of tergum and extending only two-thirds the length of segment on the middle line; the lobes of the tergum are rather quadrate. (Siam).....**siamensis** Hardy

    Ninth tergum extending almost to apices of sternum. Submedian lobes of sternum with a subapical point on outer side (Fig. 25*b*). Cleft of tergum broadly V-shaped about one-third as wide as tergum and nearly bisecting segment (Fig. 25*a*). (Indonesia)...**subvarians** Walker

35. Posterior margin of ninth sternum with a pair of elongate submedian rodlike lobes 36

    No such rod-shaped lobes.....37

36. Lobes of ninth tergum widely divergent at apices. The claspers extend well beyond apices of lobes on hind margin of sternum. Both lobes on posterior margin of sternum about equal in size, neither is one-half as long as clasper. (Bougainville, Solomon Islands). **gurneyi** Hardy

    Lobes of ninth tergum not divergent. Claspers not extending to apices of rodlike lobes. Upper lobe on each side of sternum as long as clasper. (Solomon Islands) ..... **laffooni** Hardy

37. Ninth sternum with a large semimembranous extension on hind margin (posterior median portion), this is longer than the remainder of segment and two-thirds as long as claspers. A very strong pair of accessory aedeagal structures extend well beyond claspers. Posterior lateral margins of sternum with a pair of small lobes. (Solomon Islands) ..... **manni** Hardy

    Not as above 38

38. Either the ninth sternum or tergum forcipate or produced at apices into slender pointed lobes, about equal in length to remainder of segment and often curved inwardly 39

    Ninth sternum or tergum without forcipate lobes; lobes not one-half the length of segment and tergum rounded at apices 44

39. Ninth tergum forcipate, sternum not. 40

    Ninth sternum forcipate, tergum not. 42

40. Front portion of mesonotum with a large black spot in middle. Posterior lateral margins of ninth sternum produced into pointed lobes (Fig. 4*a*). (Burma) ..... **burmensis** n.sp.

    Mesonotum entirely rufous. Posterior lateral margins of sternum not produced 41

41. Claspers terminating in a slender spinelike lobe on inner apex. Posterior median margin of sternum developed into a lobe which extends beyond posterior lateral margins of segment (Fig. 12*a*). (Malay Peninsula) ..... **forficula** Edwards

    Claspers obliquely truncate at apices; no such lobe. No median lobe developed on sternum (Fig. 11*b*). (Indonesia) ..... **forcipata** Osten Sacken

42. No submedian lobes on hind margin of ninth sternum. Claspers pointed on outer apices (Fig. 18*a*). Ninth tergum nearly quadrate in shape, truncate at apices (Fig. 18*b*). (Peninsular Siam) ..... **malayaensis** Hardy

    Narrow submedian lobes present along sides of each clasper, claspers not pointed on inner side (Fig. 14*a*). Ninth tergum subacutely pointed at apices 43

43. Each clasper produced into a sharp pointed beaklike subapical lobe on inner side (Fig. 14*a*). (New Britain) ..... **fumidula diversa** n. sub. sp.

    Claspers rather triangular, without a beaklike point (Fig. 15*a*). (New Guinea) ..... **inconspicua** Hardy

44. Ninth sternum with two or three well-developed lobes on posterior median margin. No lateral lobes 45

    Ninth sternum without conspicuous median lobes 46

45. Ninth sternum with a pair of lobes on posterior median margin separated by a U-shaped concavity, these extend beyond apices of claspers. (Borneo) ..... **borneensis** Edwards

    Ninth sternum with a pair of rather small lobes, not extending half as long as claspers; a large flat-topped projection separates the two lobes. Claspers dentate apically (Fig. 6*a*). (Australia, Tasmania) ..... **dimidiata** Macquart

46. Ninth sternum but slightly broader than long, hind margin not noticeably concave and with a pair of tiny median lobes. (Buru Island)..... **buruensis** Edwards

    Ninth sternum much wider than long, concave on hind margin and with no lobes in middle.....47

47. Posterior lateral margins of ninth sternum drawn to a sharp point (Fig. 27*a*). Claspers, seen in end view, bilobed at apex (Fig. 27*b*). (Sumatra, Java)..... .....**tergorata** Rondani

    Ninth sternum rounded on posterior lateral margins. Claspers not bilobed...48

48. Claspers acutely pointed at apices. Aedeagus with well-developed rodlike accessory structures extending to tips of claspers, these have two additional basal lobes (Fig. 9*a*). (Malaya, Borneo)..... .....**dubia** Edwards

    Claspers rounded at apices. Accessory structure not so developed. (Java).... .....**tjibodensis** Edwards

Plecia amplipennis Skuse
Fig. 1*a–c*

Plecia amplipennis Skuse, 1888, Linn. Soc. N. S. Wales, Proc. (2)3: 1372.

Skuse later (1891, Linn. Soc. N. S. Wales, Proc. (2)5: 635) considered *P. amplipennis* as a synonym of *P. fulvicollis* Fabricius, but I believe it is quite obvious that he was wrong. *P. amplipennis* agrees with *fulvicollis* only in having the thorax entirely rufous. The male genitalia are distinctly different, refer to Figures 1*a* and 13*b*. The broad rounded lobes of the ninth tergum are very densely black haired (Fig. 1*c*). The clasping structures are acutely pointed at apices and are joined together at bases by a sclerotized bridge. The ninth sternum is two times broader than long and the aedeagus has a pair of rodlike accessory structures (Fig. 1*a*).

The female specimens are very similar to those of *fulvicollis* Fabricius and *aruensis* Edwards except that the antennae are entirely dark brown to black. The female antennae are 11-segmented. The front has a prominent longitudinal ridge extending from the ocelli to antennae, this is entirely black; in *aruensis* the lower part is yellowish.

Length: Body, 6.0–8.5 mm.; wings, 7.0–9.5 mm.

The species was described from Queensland, Australia. I have studied specimens from numerous localities in Queensland, New Hebrides, Java, Papua, New Guinea, and the Solomon Islands. The specimens from areas outside of Queensland have been just slightly smaller and the claspers of the male are not so slenderly pointed as in the typical form (Fig. 1*a*, *b*). This was also pointed out by Hennig (1940, Arb. über Morph. u. Taxonom.

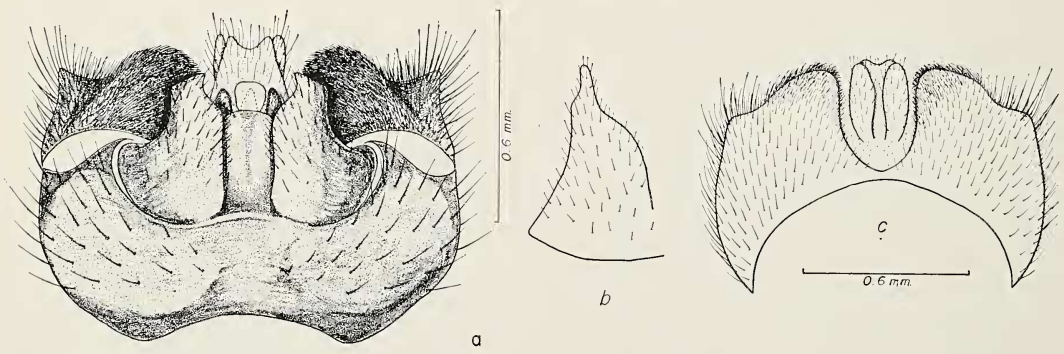

FIG. 1. *Plecia amplipennis* Skuse. *a*, Genitalia, ventral view; *b*, left clasper of typical *amplipennis; c*, ninth tergum.

Ent. 7:254, Figs. 21, 22). Some variation has also been seen in the shape of the ninth tergum.

Type in the Macleay Museum, Sydney.

Plecia aruensis Edwards
Fig. 2*a–c*

Plecia aruensis Edwards, 1925, Treubia 6(2): 159.

This species belongs in the *fulvicollis* group by having the thorax entirely opaque orange. It is distinguished from all known species by the presence of a pair of large median lobes at the apex of the ninth sternum of the males and by the unusual development of the claspers.

MALE: Antennae 10-segmented, the apical one, however, is very small and inconspicuous. The scape and pedicel are yellow, the remainder of the antennae brown to black. Ocellar tubercle very well developed. Thorax entirely opaque orange, except for a very narrow brownish vitta down middle of scutellum. Thorax devoid of pile except for a few pale hairs on the sternopleura. Halteres dark brown to black, with pale bases. Legs all black and densely black pilose, all segments slender. Wings rather dark brownish fumose, stigma scarcely differentiated from the wing membrane. Vein R_{2+3} straight and forming about a 70° angle with R_{4+5}. Costa extending nearly one-half the distance between the tips of R_{4+5} and M_1. Cubital cell widely open in the wing margin but the cubital vein is bent down rather sharply at its apex. Abdomen black, densely black pilose, about equal in length to the head and thorax combined. Genitalia very densely covered with long black pile. Ninth tergum cleft nearly to its base on the hind margin (Fig. 2*c*). The ninth sternum is developed into a pair of strong apical lobes which are separated by a V-shaped concavity (Fig. 2*a*). Each of these lobes is partially developed into two lobes at its apex and each has a small inconspicuous ventral lobe on the dorsal surface. The dististyli are very unusual and apparently not functional as claspers.

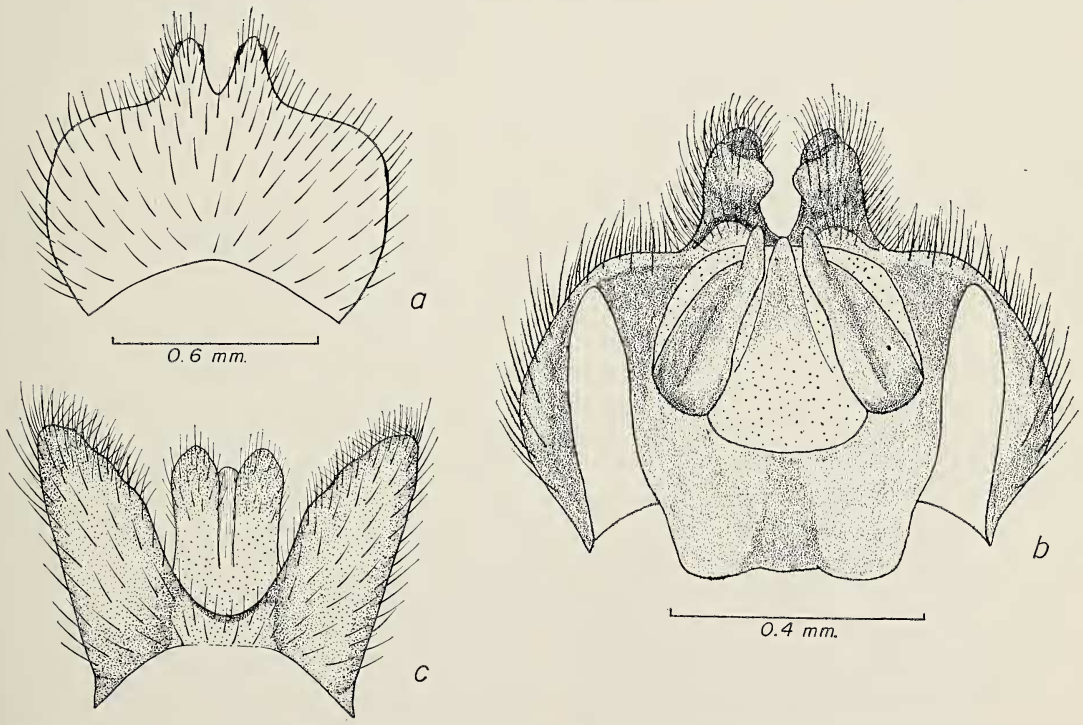

FIG. 2. *Plecia aruensis* Edwards. *a*, Ninth sternum; *b*, genitalia, dorsal view, ninth tergum removed; *c*, ninth tergum.

They lie rather deep in the genital chamber and are visible only from end view or when the genitalia are tilted back (as in Fig. 2*b*). The dististyli are heavily sclerotized on their inner margins and appear to serve as supporting structures for the aedeagus; each has a small point at upper edge of the apex.

Length: Body, 5.0–7.0 mm.; wings, 6.0–8.0 mm.

FEMALE: Antennae 11-segmented, counting the small tip. The front is raised in the middle into a prominent ridge which extends from the ocelli to the antennae; this ridge is developed into a strong tubercle just before the antennae. The front and face are brownish-black in ground color and densely grayish pubescent; the tubercle at the lower part of the front is yellowish in color. The wings are darker brown fumose than in the male.

Length: Body, 7.0–9.5 mm.; wings, 10.0–12.0 mm.

The species has been found to be quite variable in size. Edwards said that it is smaller than *fulvicollis* and the wing of his type was recorded as 5.0 mm.

TYPE LOCALITY: Aru Islands.

Type in the British Museum (Natural History).

I have studied the type and numerous specimens from many localities in New Guinea (Netherlands, Papua, and Northeast), Aru, and Buru islands.

Plecia bakeri Malloch

Fig. 3*a*, *b*

Plecia bakeri Malloch, 1928, Linn. Soc. N. S. Wales, Proc. 53(5): 605.

Fitting in the *fulvicollis* complex because of the all rufous thorax and readily differentiated from all known *Plecia* by the genital characters of the male. The ninth sternum is produced on posterior median margin into a pair of slender lobes separated by a narrow V-shaped cleft. The claspers are rather slender, pointed, and curved inward, they extend about two-thirds their length beyond the apex of the sternum

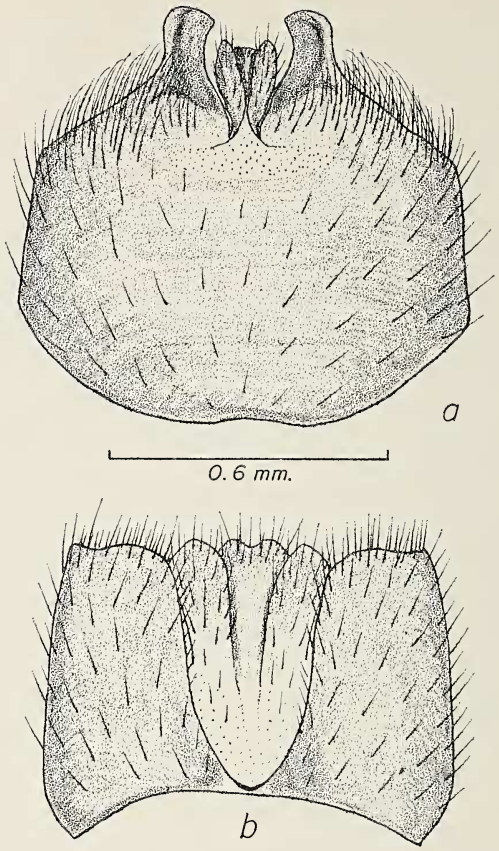

FIG. 3. *Plecia bakeri* Malloch. *a*, Ninth sterum; *b*, ninth tergum.

(Fig. 3*a*). The ninth tergum is divided into two plates by a deep V-shaped cleft on the hind margin (Fig. 3*b*).

Length: Body and wings, 6.0–7.5 mm.

Described from Baguio, Benquet, Philippine Islands. I have seen specimens from several localities on Luzon, Los Banos, Bataan, Pampanga, and Mindanao, Philippine Islands.

Type in the U. S. National Museum.

Plecia borneensis Edwards

Plecia borneensis Edwards, 1931, Jour. Fed. Malay States Mus. 16: 489, fig. 1.

A small species whose genitalia closely resemble those of *P. aruensis* Edwards. It is differentiated by having the pleura dark; the male with but six segments in the antennal

flagellum, the front tarsi of the male stout and somewhat flattened, and the ninth tergum developed into a pair of small lobes at apex, these are separated by a U-shaped cleft (see Edwards, *loc. cit.*, fig. 1).

Length: Body and wings, 4–6 mm.

Known only from the type taken at Bettotan, Borneo.

Type in the British Museum (Natural History).

Plecia burmensis n. sp.

Fig. 4*a*, *b*

Fitting in the *impostor* complex by having the pleura all black and the mesonotum rufous with a black spot in middle of the front margin. In my key to this group (Hardy, 1953, Rec. Indian Mus. 50(1): 90) it runs in couplet 3 to *malabarana* Hardy and is very closely related to this species. It differs by having the lobes of the tergum curved inward, broad, truncate at apices, not tapered (best seen from lateral view), and the median cleft is more narrowly U-shaped; rather than the lobes being straight, evenly tapered to a subacute apex and the cleft broadly U-shaped. Also the posterior lateral margins of the ninth sternum are evenly tapered into a moderately large pointed lobe lying just outside each clasper and extending three-fourths the distance to apex of clasper and the claspers are rather gently tapered to a subacute apex (Fig. 4*a*). In *malabarana* the posterior lateral margins of the sternum are just slightly elevated and a small inconspicuous lobe is present just outside each clasper, also the claspers are extended into a sharp pointed apical projection.

MALE. *Head:* Antennae black, tinged with rufous on basal segments, 9-segmented. Ocellar tubercle large. *Thorax:* As stated above, the blackened portion covering the anterior fourth of the mesonotum. Halteres with yellow to rufous stems and brown to black knobs. *Legs:* Brown to black, segments slender. *Wings:* Faintly brownish fumose, stigma not darker than the membrane. Vein R_{2+3} at about a 50° angle to R_{4+5}. *Abdomen* and *genitalia:* Entirely black with considerable gray pubescence on the dorsum. Genitalia as described above and as in Figure 4*a*, *b*.

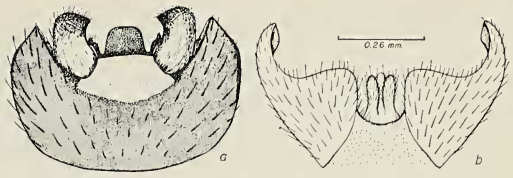

FIG. 4. *Plecia burmensis* n. sp. *a*, Ninth sternum; *b*, ninth tergum.

Length: Body, 3.3 mm.; wings, 3.9 mm.

FEMALE: Like the male except for sexual differences and except that the mesonotum is entirely rufous. Head densely gray pubescent, front raised down the median portion. Bases of femora yellowish tinged.

Length: Body, 3.9 mm.; wings, 5.0 mm.

Holotype male, allotype female, and two paratype females, Upper Burma, Nam Tamai Valley, Lat. N. 27° 42′, Long. E. 97° 54′, 3,000 ft. elev., Aug. 1938 (R. Kaulback).

Type and allotype returned to British Museum (Natural History). One paratype each in the U. S. National Museum and the University of Hawaii collection.

Plecia buruensis Edwards

Plecia buruensis Edwards, 1926, Treubia 7: 135.

This species fits near *P. tjibodensis* Edwards but the male genitalia are distinctive. It is best distinguished by the shape and development of the ninth sternum and clasping structures as figured by Edwards (*loc. cit.*, fig. 1). The sternum is but little wider than long, the hind margin is but slightly concave and has a pair of small median lobes. The claspers are short and broad and abruptly attenuated at apices. The ninth tergum is deeply cleft on hind margin.

Length: Body, 7.0 mm.; wings, 8.0 mm.

Known only from Buru Island.

Type in the Zoologisch Museum, Amsterdam.

Plecia cana Hardy

Plecia cana Hardy, 1950, Hawaii. Ent. Soc. Proc. 14: 76, fig. 2a, b.

A small dark-colored species related to *P. tristis* van der Wulp and differentiated by having the thorax entirely light gray with no black longitudinal stripes. The antennae are also distinctly 9-segmented; Edwards (1932, Treubia 14: 140) reported that the flagellum of *tristis* contains but four distinct segments. The male genitalia are distinctive from all known species of *Plecia*; the broad flat-topped development of the median margin of the ninth sternum and the well-developed lobes on the posterior lateral margins will separate it; see figures referred to above.

Length: Body, 4.2–4.5 mm.; wings, 5.4–5.8 mm.

Known only from Benguet, Philippine Islands.

Type in the U. S. National Museum.

Plecia decora Hardy

Fig. 5

Plecia decora Hardy, 1950, Hawaii. Ent. Soc. Proc. 14: 78, fig. 3a–c.

Related to *P. forcipata* Osten Sacken and *forficula* Edwards because of the forcipate development of the male genitalia. It is characterized from other *Plecia* by the coloration and by the details of the male genitalia.

Predominantly dull reddish species, with three brownish-red vittae on the mesonotum. Coxae, trochanters, and bases of femora yellowish. Wings faintly brown fumose. Vein R_{2+3} forms about a 40° angle to R_{4+5}. Male genitalia as in Figure 5 and as described and figured in original. Claspers bilobed as seen from lateral view, with a sharp pointed secondary subbasal lobe arising from dorsal portion.

Length: Body, 5.0–7.0 mm.; wings, 8.0–10.0 mm.

TYPE LOCALITY: Mt. Tafa, Papua.

Type in the British Museum (Natural History).

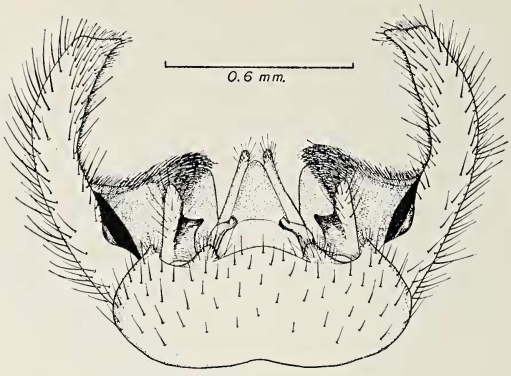

FIG. 5. *Plecia decora* Hardy. Genitalia, ventral view.

I have studied a large series of specimens from the Rijksmuseum v. Natuurlijke Historie, Leiden, and the Bernice P. Bishop Museum New Guinea Exped.: Moss Forest Camps 13, 14, 16, 19, and 31, 2800 m.; from Scree Valley Camp, 3800 m., Nov. 1938 (L. J. Toxopeus); from Araboebivak, Wisselmeren, Paniai, New Guinea, 1750 m., Sept.–Nov. 1939 (H. Boschma); and Daulo Pass, 2400 m., (Asaro–Chimbu div.), June 15, 1955 (J. L. Gressitt).

Plecia dimidiata Macquart

Fig. 6*a*, *b*

Plecia dimidiata Macquart, 1846, Dipt. Exot., Sup., p. 20, fig. 8.

Related to *P. borneensis* Edwards but distinguished by the genital characters. The ninth sternum has a well-developed flat-topped lobe in middle of hind margin and a pair of smaller submedian lobes. The claspers are expanded and dentate apically and extend well beyond apices of the tergum (Fig. 6*a*). The ninth tergum has a deep V-shaped cleft on hind margin (Fig. 6*b*).

The mesonotum is chiefly semipolished rufous with the front margin broadly blackened. The black coloration extends to a level slightly behind the humeri. The pleura are all black. The legs are all black with black pile. The femora are moderately swollen. The

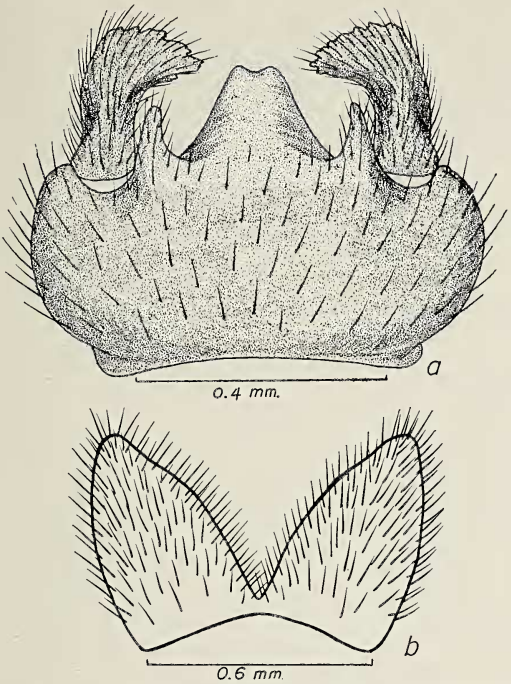

FIG. 6. *Plecia dimidiata* Macquart. *a*, Ninth sternum; *b*, ninth tergum.

wings are light-brown fumose.

Length: Body, 5.0–6.0 mm.; wings, 4.5–6.5 mm.

Described from Tasmania, known also from Australia. The type probably has been lost.

I have studied a series of specimens from both countries in the British Museum (Natural History), previously determined by Edwards.

Plecia disjuncta n. sp.
Fig. 7*a–c*

An all-black species (males) closely related to *P. monticola* n. sp. and fitting the description of that species in all details of the male except for the genitalia. It is readily distinguished by the development of the lobes of the ninth sternum as shown in Figure 7*a* and described below.

MALE. *Genitalia:* Ninth tergum divided into two plates connected at bases by a narrow sclerotized line (Fig. 7*c*). The ninth sternum is greatly expanded laterally and extends around the sides of the genitalia (Fig. 7*b*); the posterior lateral lobes are comparatively broad, rounded at apices, and serrated just below apices on inner margins (Fig. 7*a*). The claspers are slender, attenuated, shaped approximately as in *monticola*.

Length: Body, 3.0 mm.; wings, 3.8 mm.

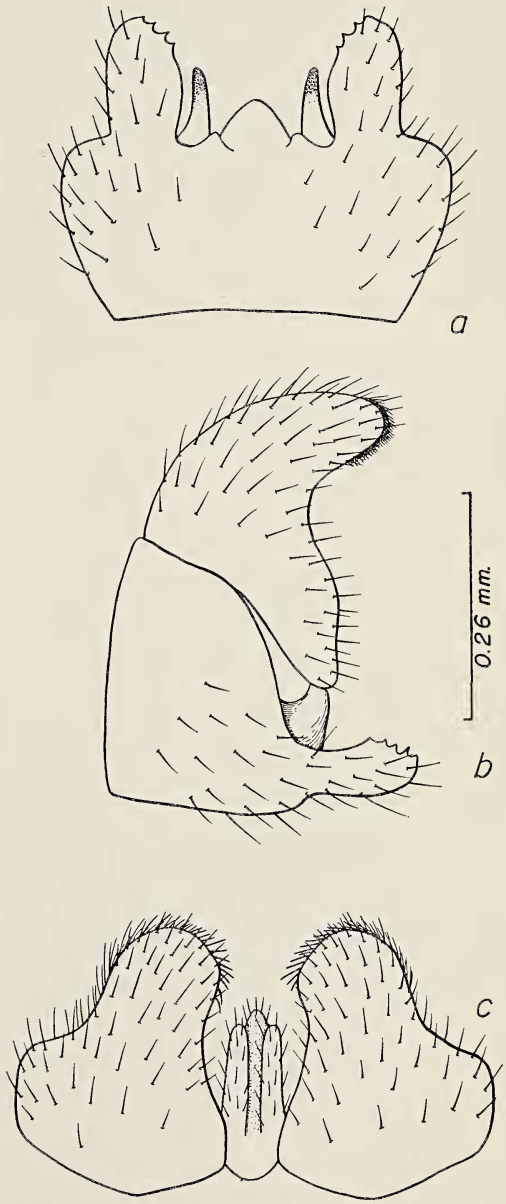

FIG. 7. *Plecia disjuncta* n. sp. *a*, Ninth sternum; *b*, genitalia, lateral view; *c*, ninth tergum.

FEMALE: Antennae 7-segmented. Thorax entirely rufous except for brown markings on the pleura; sometimes the mesonotum is extensively discolored with brown. Legs, especially the femora, tinged with yellow. Abdomen with a rufous tinge on the venter.

Length: Body, 3.3 mm.; wings, 4.8 mm.

Holotype male and allotype female in copula from Wisselmeren, Okaitadi, Netherlands New Guinea, 1800 m., Aug. 8, 1955 (J. L. Gressitt). Twelve paratypes: 1 ♂, 3 ♀♀, same data as type; 1 ♂, 1 ♀, Wisselmeren, Waghete, Tigi L., Netherlands New Guinea, 1700 m., Aug. 17, 1955; 1 ♀, Wisselmeren, Enarotadi, Netherlands New Guinea, 1900 m., Aug. 19, 1955 (J. L. Gressitt); 1 ♀, Wisselmeren, Obano, 1770 m., Aug. 9, 1955 (J. L. Gressitt); and 2 ♂♂, 2 ♀♀ from Wisselmeren, Itouda, Kamo V., 1500 m., Aug. 13, 1955 (J. L. Gressitt).

Type, allotype, and 6 paratypes in the Bernice P. Bishop Museum. The remainder in the U. S. National Museum, the British Museum (Natural History), and the University of Hawaii collection.

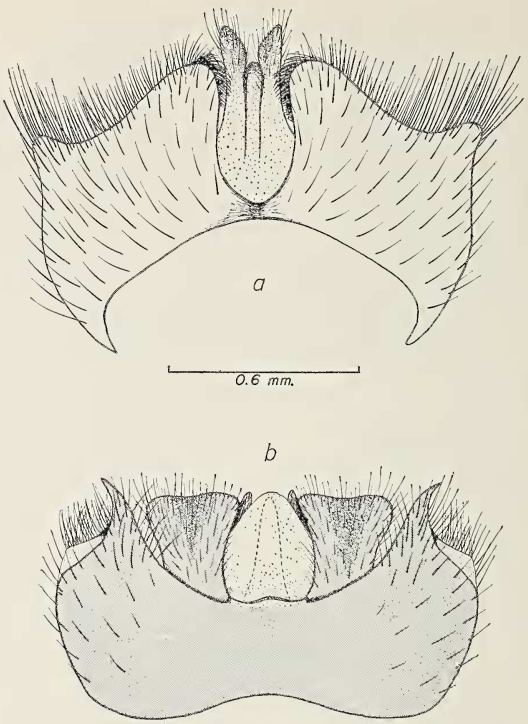

FIG. 8. *Plecia dispersa* n. name. *a*, Ninth tergum; *b*, ninth sternum.

Plecia dispersa n. name
Fig. 8*a*, *b*

Penthetria thoracica Guérin-Méneville, 1838, in Duperrey, Voy. autour du Monde sur la Corvette de la Coquille, 2: 507. Paris. Preoccupied by *Laphria thoracica* Fabricius, 1805, System. Antl., 163, a synonym of *Plecia collaris* (Fabricius).

Plecia confusa Malloch, 1928, Linn. Soc. N. S. Wales, Proc. 53: 605, *nec P. confusa* Loew. New synonym. By comparison of the type in the British Museum with specimens of *P. thoracica* Guérin, which had been determined by F. W. Edwards.

Plecia mallochi Hardy, 1948, Kans. Ent. Soc. Jour. 21: 36. Change of name for *P. confusa* Malloch, preoccupied by *P. confusa* Loew, 1858, Berlin. Ent. Ztschr. 2: 109. New synonym.

A moderately large species with the thorax all rufous and the ocellar triangle reduced in size. It is related to *P. javensis* Edwards but the male genitalia are differently developed; the blunt claspers and the differences in the shape and development of the ninth sternum and tergum (Fig. 8*a*, *b*) will readily differentiate *dispersa*.

The ocellar tirangle is rather inconspicuous, about equal in length to about five eye facets and about one-third normal size. Antennae chiefly brown to black, rufous on basal segments; 10-segmented in male and 11-segmented in female. Ninth tergum of male about two times wider than long, with a deep rather narrowly U-shaped cleft in the middle of the hind margin; the apical lobes of the tergum are heavily sclerotized and densely haired (Fig. 8*a*). Ninth sternum of male over two times wider than long, narrow through the median portion, with the posterior lateral margins produced into pointed lobes. Claspers about two times longer than wide, blunt and

rounded at apices, and with a narrow sclerotized bridge joining them at bases (Fig. 8*b*). Aedeagus with a pair of slender, rodlike accessory structures.

Length: Body, 7.5–8.5 mm.; wings, 8.5–9.3 mm.

TYPE LOCALITY: (Of *P. thoracica* Guérin) Coromandel, S. E. India.

Type probably in the Muséum National d'Histoire Naturelle, Paris.

This is one of the common species of India and Ceylon. I have seen specimens from several localities on Ceylon; from Mysore, Nilgiri Hills Coimbatore, S. Malabar, Katihar, N. Bengal, and from Tezpur, Assam, India. Also a female from Naukauri, Nicobar Islands, appears to be this species.

Edwards also recorded this from many localities in India and Ceylon and said that Brunetti's records of *Plecia fulvicollis* Fabricius should refer to this.

Plecia dorsalis Walker

Plecia dorsalis Walker, 1857, Linn. Soc. London, Proc. 1: 5. Preoccupied by *Plecia dorsalis* Macquart, 1838, Dipt. Exot. 1: 86.

It is impossible to place Walker's *dorsalis* and this species must be treated as a *species dubium*. In the original description, Walker indicated that both sexes were present in his type series from Singapore and Mount Ophir. No type was designated and the description, based only upon color, would fit both sexes of all of the species of the *fulvicollis* complex (those with the thorax entirely rufous). If Walker had a male (or males) in the original series, it has apparently been lost. I could not find it in the British Museum (Natural History) collection. At least part of Walker's series is in the National Museum of Victoria, Melbourne, Australia. A. Neboiss has reported that they have one female specimen from Singapore and one female from "Mt. Ophir, one wing missing, abdomen glued on and belonging to a different species of Diptera." Without a male from one of the two localities mentioned by Walker, it is impossible to place this species. Walker later recorded *dorsalis* from the Aru Islands, Borneo, Mysol, and Amboyna but it is probable that he had a mixture of species before him. One male from Sarawak, Borneo, in the National Museum of Victoria, has been studied by A. Neboiss and from the drawings which he made at my request it is obviously a specimen of *P. subvarians* Walker.

P. dorsalis Walker has commonly been treated in the literature as a synonym of *P. fulvicollis* (Fabricius) but it is not possible to confirm this synonymy. Brunetti (1912, Fauna of British India, Diptera Nematocera, p. 163) was obviously in error when he recorded *dorsalis* from India as a synonym of *P. fulvicollis* (Fabricius).

Plecia dubia Edwards
Fig. 9*a–c*

Plecia dubia Edwards, 1928, Jour. Fed. Malay States Mus. 14: 44, figs. 39, 39a.

The genitalia show relationship with *P. amplipennis* Skuse but the specimens are much smaller, the pleura are predominantly brown to black, and the genital structures are differently developed (Figs. 9*a*, 1*a*).

A moderately small species, somewhat variable in size. Antennae 9-segmented in male, 11 in female, entirely black except for a rufous tinge at apices of basal segments. Ocellar tubercle large and conspicuous. Thorax entirely rufous on the dorsum and on the lower portion of the pleura. Upper half of pleura dark brown to black. Stems of halteres yellow, knobs brown. Legs brown to black, rather stout, segments straight. Wings light brown fumose, darker along the costa, stigma not darker than the membrane. Vein R_{2+3} arises just slightly before the middle of the distance from r-m to the wing margin, is about equal in length to r-m and nearly vertical in position. Ninth tergum with a U-shaped cleft in middle of hind margin, hind margin and postero-

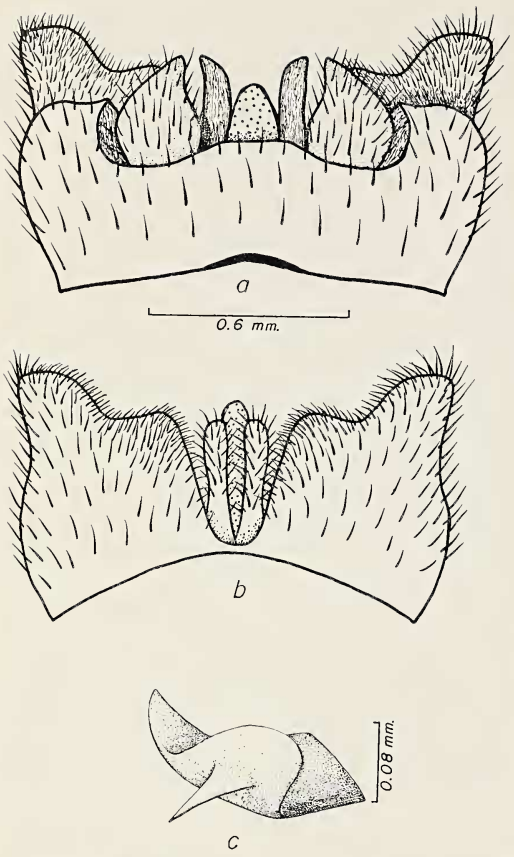

FIG. 9. *Plecia dubia* Edwards. *a*, Ninth sternum; *b*, ninth tergum; *c*, accessory structure of aedeagus, end view.

dorsal surface very densely black pilose (Fig. 9*b*). The claspers are short and broad, slightly pointed apically. The ninth sternum is approximately three times wider than long, not distinctly lobate on hind margin (Fig. 9*a*). The aedeagus has a pair of heavily sclerotized rather rodlike accessory structures, each of these possess a small sharp pointed subapical ventral lobe and a long dorsal lobe is developed, these are visible only in end view (Fig. 9*c*).

Front of female with a strong black tubercle in middle at lower margin but with no ridge down the middle.

Length: Body, 3.5–6.0 mm.; wings, 4.0–7.5 mm.

TYPE LOCALITY: Singapore.

Type in British Museum (Natural History).

I have studied the type and a series of specimens from Borneo, 1903 (R. Shelford), and Samarang, Java, Aug. 1909 (E. Jacobson), which appear to belong here.

Plecia erebea Skuse
Fig. 10*a–c*

Plecia erebea Skuse, 1889, Linn. Soc. N. S. Wales, Proc. (2)3: 1375.

This is the only all dark-colored *Plecia* known from Australia. It is distinguished from the other members of this complex from other areas by the characteristics of the male genitalia (Fig. 10*a–c*).

MALE: Entirely brownish black to black, all pile black, dense on abdomen and legs. Eyes bare, ocellar tubercle prominent. Antennae 10-segmented, counting the small nipplelike apices. Thorax subshining with a faint brownish tinge in the ground color. Dorsum sparsely

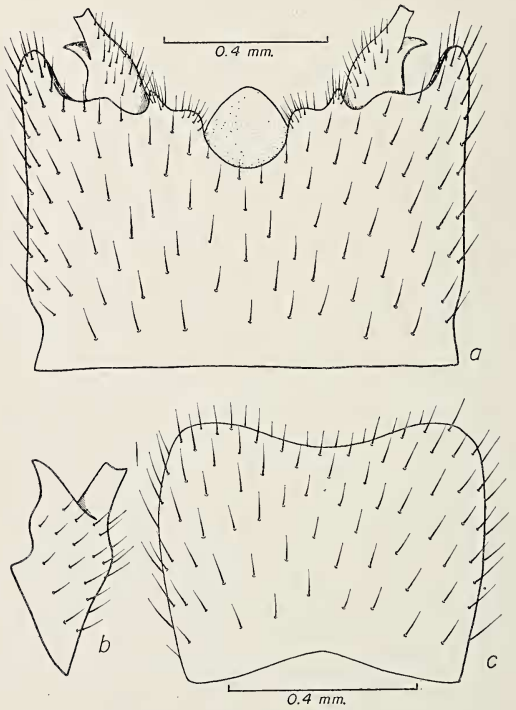

FIG. 10. *Plecia erebea* Skuse. *a*, Ninth sternum; *b*, clasper, lateral view; *c*, ninth tergum.

pilose, dorsocentral hairs very short. All leg segments slender, tibiae not at all enlarged at apices. Tibial spurs all black. Wings dark brown fumose, darkest along the anterior margin. The stigma are not well differentiated from the wing membrane. Vein R_{2+3} gently curved, forming about a 50° angle with R_{4+5}. The section of M_{1+2} from the fork to the r-m cross vein is nearly one-half longer than the cross vein. The cubital cell is not at all narrowed at its apex. Abdomen faintly shining, lightly tinged with brown in ground color. The ninth tergum is almost as long as wide and the hind margin is gently concave (Fig. 10*c*). The sternum has a moderately large, obtuse lobe at each side on hind margin and a smaller inconspicuous lobe just inside each clasper. The median portion of the hind margin has a broadly U-shaped concavity (Fig. 10*a*). The claspers are bilobed; the ventral lobe is square tipped and the dorsal lobe is acutely pointed (Fig. 10*a*, *b*).

Length: Body, 5.5 mm.; wings, 6.0–6.3 mm.

FEMALE: Head shining black in ground color, densely grayish pubescent and wider than long from a dorsal view. The antennae appear to be 11-segmented but the last two are very closely joined. The front has a small, shining black tubercle in middle just above the antennae. Otherwise like the male, except for genital characters.

Length: Body, 5.0–5.5 mm.; wings, 7.0–7.5 mm.

TYPE LOCALITY: Lawson, Blue Mountains, Australia.

Type in the Australia Museum.

The above described specimens were from Malanda, North Queensland (G. F. Hill).

Plecia forcipata Osten Sacken

Fig. 11*a*, *b*

Plecia forcipata Osten Sacken, 1881, Ann. del Mus. Civ. di Storia Nat. di Genova 16: 397.

This species may be somewhat variable, some of the specimens which I have seen from the British Museum collection have the dorsum of thorax orange, including scutellum and metanotum, and the pleura marked with black. The type male in the Museo Civico di Storia Naturale, Genova, has the thorax entirely rufous. The original description mentions a characteristic uninterrupted reddish stripe which extends across the pleura from one halter to the other, this is the case in the specimens in the British Museum collection; the metapleura, lower part of pteropleura, and all of sternopleura are rufous and the propleura, mesopleura, and hypopleura are black. The strongly forcipate ninth tergum allies this to *forficula* Edwards but the claspers and sternum are differently developed as pointed out in the above key and as shown in Figures 11*a* and 12*a*. The tergum of the type fits my

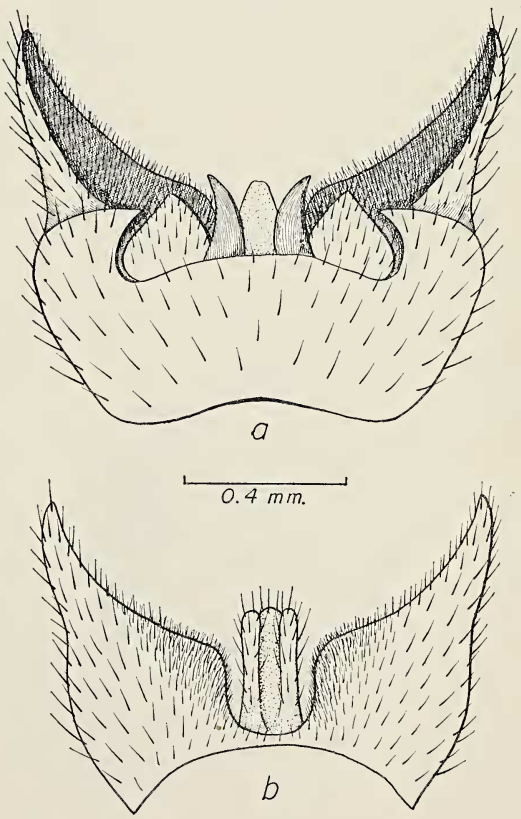

FIG. 11. *Plecia forcipata* Osten Sacken. *a*, Ninth sternum; *b*, ninth tergum.

concept of the species but it was studied *in situ* and the details of the sternum and claspers could not be seen. It is possible that two species may be involved in this concept.

MALE: Ocellar tubercle well developed. Antennae 9-segmented, apical segment equal in length to the penultimate. Legs rather short and stout, femora moderately swollen on apical portions, tibiae slender. Wings brownish fumose, darker along anterior margin. Vein R_{2+3} straight or nearly so, forming a 75° angle with R_{4+5}. Petiole of cell M_1 not over one-half longer than r-m cross vein. Cubital cell noticeably narrowed at apex, apex about one-half as long as r-m cross vein. Abdomen dark brown to black, not so densely pilose as in most species. The lobes of the ninth tergum are narrow and pointed, nearly two times longer than the sternum (Fig. 11*b*). The claspers are short and broad, rather blunt at apices. A pair of sharp pointed accessory organs are present along sides of the aedeagus. The ninth sternum is about two times wider than long (Fig. 11*a*).

Length: Body, 7.0–8.0 mm.; wings, 6.5–7.0 mm.

TYPE LOCALITY: Sumatra.

Type in the Museo Civico di Storia Naturale, Genova.

I have studied the type and specimens from Sumatra, New Guinea, and Christmas Island, Indian Ocean; de Meijere recorded it from Java.

Plecia forficula Edwards
Fig. 12*a*, *b*

Plecia forficula Edwards, 1928, Jour. Fed. Malay States Mus. 14: 44, fig. 40.

Similar to *P. minor* Edwards but larger and the genitalia are quite differently developed; the strongly forcipate ninth tergum will differentiate it. *P. forficula* Edwards is separated from *forcipata* Osten Sacken by the development of the claspers and sternal structures of the male genitalia as shown in Figures 12*a* and 11*a* and as pointed out in the above key.

MALE: Head black. Antenna 9-segmented, counting the nipplelike tip. Ocelli situated on a strong tubercle. Rostrum short, not over three-fourths as long as antenna. Thorax chiefly opaque, mesonotum, scutellum, metanotum, and lower portion of pleura rufous; upper half of pleura with brown to black discolorations. Legs black, segments slender; front tibiae not at all thickened, much narrower than femora. Wings light brown fumose, darker along costal margin. Vein R_{2+3} rather straight, forming about a 75° angle with R_{4+5}. Petiole of cell M_2 two times longer than r-m

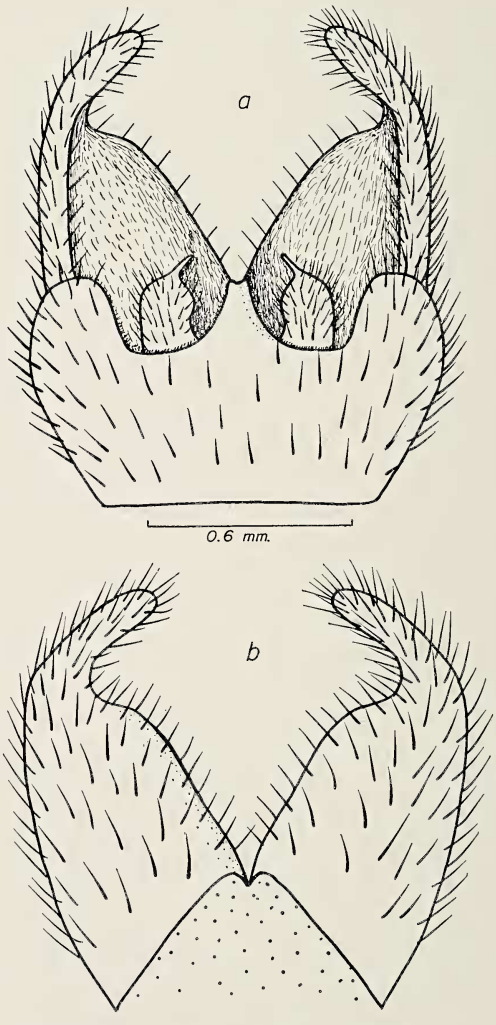

FIG. 12. *Plecia forficula* Edwards. *a*, Genitalia, ventral view; *b*, ninth tergum.

cross vein. Cell C_u not narrowed. Abdomen and genitalia black. Ninth tergum strongly forcipate, the lobes slender and curved inward (Fig. 12*b*). Ninth sternum almost two times wider than long, a broad rounded lobe is developed on the posterior lateral margin and a rather narrow truncate lobe is present in the middle on the hind margin. Each clasper is developed into an elongate slender lobe at apex (Fig. 12*a*).

The female antennae are apparently 11-segmented and according to Edwards the pleura are less extensively blackened.

Length: Body, 6.0–7.0 mm.; wings, 9.0 mm.

TYPE LOCALITY: Pahang, Lubok Tamang.

Type in the British Museum (Natural History).

I have studied the type and specimens in the British Museum from Pahang Federated Malay States, Cameron's Highlands, at light, 4,800 ft., Mar. 13, 1925 (H. M. Pendlebury).

Plecia fulvicollis (Fabricius)

Fig. 13*a–c*

Hirtea fulvicollis Fabricius, 1805, System. Antl., 53.

Plecia philippinensis Malloch, 1928, Linn. Soc. N. S. Wales, Proc. 53(5): 605. New synonym.

The synonymy of *philippinensis* Malloch is based upon the comparison of specimens of *fulvicollis* (Fabricius) from Sumatra, which had been identified by Dr. F. W. Edwards, with a large series of specimens from the Philippines which fit Malloch's description and figure.

A number of distinct species have been confused in the literature under the name *fulvicollis;* some authors used this name for all Pacific and oriental *Plecia* which have the thorax entirely rufous.

This species is close to *P. bakeri* Malloch and is differentiated by the differently developed genitalia of the male. In *fulvicollis*, the ninth tergum has a more U-shaped cleft on the hind margin (Fig. 13*a*), the lobes are rounded

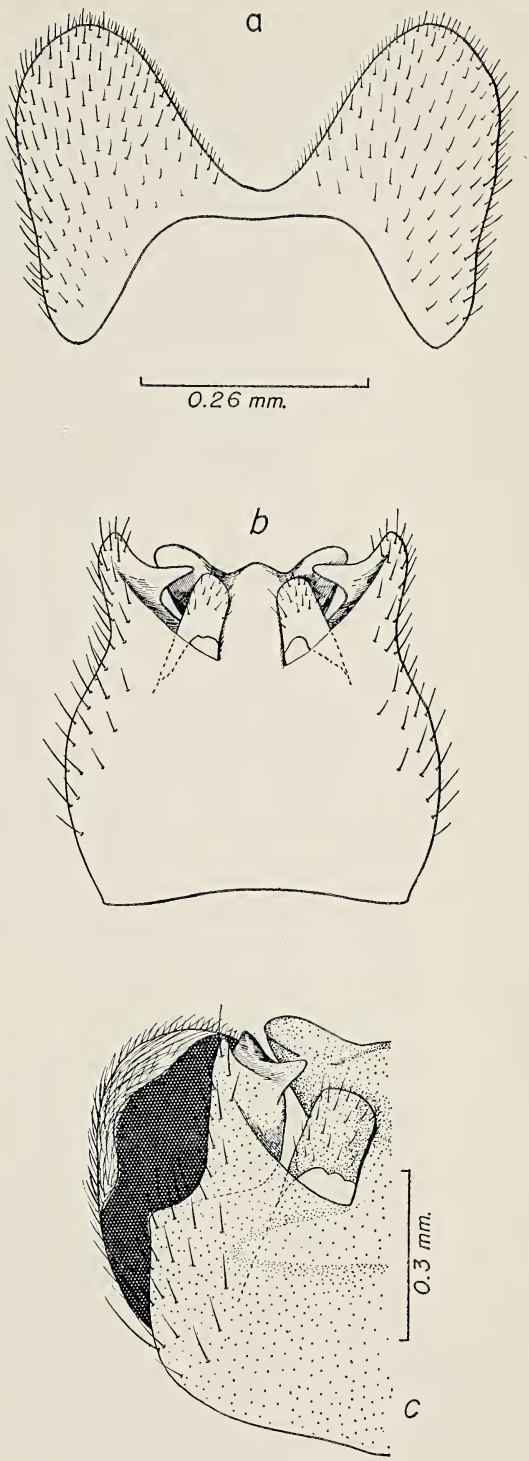

FIG. 13. *Plecia fulvicollis* (Fabricius). *a*, Ninth tergum; *b*, genitalia, ventral view; *c*, ninth sternum, tilted back.

not truncate. The ninth sternum is about as wide as long, each posterior lateral margin is produced into three lobes at apex (seen in end view or slightly tilted ventral view). The posterior median margin is strongly produced into a broad, heavily sclerotized, bilobed (indistinctly trilobed and with each of the lateral lobes slightly divided subapically) process. The claspers are small, inconspicuous, rounded at apices; fused with the median process of the sternum and extending about half its length (Fig. 13*b*, *c*). The development of the ninth sternum and claspers of *bakeri* is very different, as shown in Figure 3*a*.

Length: Body, 5.7–6.0 mm.; wings, 6.0–6.4 mm.

TYPE LOCALITY: Sumatra.

The type probably has been lost.

The species is common in Sumatra (and probably all of Indonesia) and the Philippine Islands; I have seen it from a number of localities in both areas. Records from India, Australia, China, Japan, Formosa, etc., are probably errors. Ouchi (1940, Jour. Shanghai Sci. Inst., Sec. III, 4: 294) misspelled this "*fluviollis*." Brunetti (1912, Fauna of British India, Diptera Nematocera, p. 163) was obviously in error in recording this from India and in considering *P. thoracica* Guérin as a synonym.

Plecia fumida Edwards

Plecia fumida Edwards, 1933, Jour. Fed. Malay States Mus. 17: 244.

An entirely dull-black species fitting close to *P. furva* Hardy but with square-tipped claspers. The ninth tergum is deeply cleft on the hind margin, nearly divided into two large, triangular shaped, lobes. The posterior lateral margins of the ninth sternum are produced, rather pointed, extending beyond apices of lobes of tergum.

Length: Body, 5.0–6.5 mm.; wings, 6.5–9.0 mm.

The species has not been figured.

TYPE LOCALITY: Tenompok Pass, Borneo.

Type in the British Museum (Natural History).

Known only from Borneo.

Plecia fumidula Edwards

Plecia fumidula Edwards, 1933, Jour. Fed. Malay States Mus. 17: 244.

An entirely black species resembling *P. fumida* Edwards but much smaller and with quite different genitalia. It is related to *P. furva* Hardy but differentiated by having the lobes of the ninth sternum extending well beyond the apices of the tergum, the tergum extends only about two-thirds the length of the sternum. The ninth sternum is not so deeply cleft as in *furva*, the submedian lobes on the hind margin are much more slender and the claspers are comparatively small and each has a sharp pointed subapical lobe on the inner margin. (Refer to description of the genitalia and fig. 2a, b, Hardy, 1952, Beitr. z. Ent. 2: 428.)

Length: Body and wings, 3.5–5.5 mm.

TYPE LOCALITY: Mt. Kinabalu, Borneo.

Type in the British Museum (Natural History).

Known only from Borneo; I have studied the type and type series in the British Museum.

Plecia fumidula diversa n. sub. sp.
Fig. 14*a*, *b*

Specimens on hand from New Britain seem to fit *P. fumidula* Edwards in all respects except that the thorax is entirely orange to rufous, except for the brown to black propleura; rather than the body all black as in the typical form. I see no significant differences in the male genitalia and feel that in spite of a few minor differences which I see in the specimen at hand and the drawings I made of a cotype of *fumidula* (Hardy, 1952, Beitr. z. Ent. 2: 428, fig. 2a, b) this should be treated as a subspecies. Perhaps more significant differences will be found when a series is studied.

The antennae of the male are all black and made up of 9 distinct segments. In the female

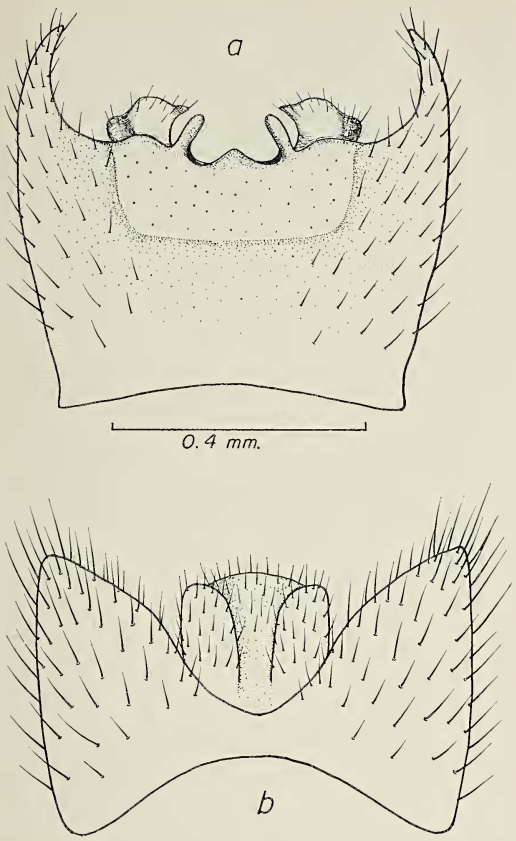

FIG. 14. *Plecia fumidula diversa* n. subsp. *a*, Ninth sternum; *b*, ninth tergum.

the antennae are 11-segmented, with the last two closely joined and the basal segments are brownish yellow. The propleura are orange colored in the female, brown to black in the male. The halteres and legs are black, with a yellow tinge in the ground color of the femora in the female. Tibiae or tarsal segments not swollen. Wings brown fumose, darker in the male. Vein R_{2+3} slightly curved in the male and straight in the female, entering the costa at about a 65° angle to R_{4+5}. The lobes on posterior lateral margins of the ninth sternum of the male are slender, sharply pointed, and slightly curved inwardly. A narrow submedian lobe is present on the sternum just inside each clasper and the median portion is raised into a small mound. The claspers are small, rounded at apex, produced into a sharp, beaklike subapical point on inner side and with a rather broad lateral expansion on outer side (Fig. 14*a*). The posterior median third to two-fifths of the sternum is membranous. The ninth tergum is deeply cleft, the lobes are subacute at apices (Fig. 14*b*).

Length of male: Body, 4.8 mm.; wings, 5.5 mm.

Length of female: Body, 3.5 mm.; wings, 4.8 mm.

Holotype male and allotype female, Kerawat, Gazelle Pen., New Britain, 60 m., Aug. 31, 1955 (J. L. Gressitt).

Both in the Bernice P. Bishop Museum collection.

Plecia furva Hardy

Plecia furva Hardy, 1952, Beitr. z. Ent. 2: 429.

An all dark colored species related to *P. fumidula* Edwards, it fits the original description in all details except that the claspers of *fumidula* were described as "small and rounded." *P. furva* is differentiated from *fumidula* by the more elongate ninth tergum, the lobes extending beyond the apices of the sternum. The lobes of the ninth sternum are much broader at their bases and are gently tapered to a sharp point at their apices; the cleft on the hind margin extends about two-thirds the length of the sternum, rather than less than half the length. The claspers are also much more developed in *furva*, they are strongly curved with a capitate, rounded, apical lobe and with the basal portion slightly hollowed out and expanded laterally; no lobe present on inner margin (refer to complete description *op. cit.*: 429–431, fig. 3a, b).

Length: Body and wings, 5.5 mm.

TYPE LOCALITY: Segare Anak, Lombok, Lesser Sunda Islands.

Type in the Deutsches Entomologisches Institut, Berlin.

Plecia gurneyi Hardy

Plecia gurneyi Hardy, 1950, Hawaii. Ent. Soc. Proc. 14: 79.

Fitting in the group of species which have the mesonotum bright orange and the pleura brown to black. It is related to *P. laffooni* Hardy and is distinguished only by the male genital characters. In *gurneyi* the ninth tergum is much broader, the cleft on the hind margin is broadly V-shaped so that the lobes of the ninth tergum are widely divergent at their apices, the claspers are much better developed than in *laffooni* and extend well beyond the apices of the submedian lobes extending from the hind margin of the sternum. The lobes on the posterior lateral margins of the sternum are tiny, poorly developed, not elongated as in *laffooni*. The accessory structures of the aedeagus are rather inconspicuous and barely protrude beyond the hind margins of the sternum, rather than strong and produced beyond apices of claspers as in *laffooni* (refer to Hardy, *op. cit.*: 81 and 83, figs. 4a, b, 6a, b).

Length: Body, 4.0–4.5 mm.; wings, 6.0 mm.

TYPE LOCALITY: Bougainville Island.

Type in the U. S. National Museum.

Plecia inconspicua Hardy

Fig. 15*a–c*

Plecia inconspicua Hardy, 1950 Hawaii. Ent. Soc. Proc. 14: 79.

A moderately small species in the complex which has the dorsum of the thorax chiefly rufous and the pleura brown to black. It is related to *P. malayaensis* Hardy because of the forcipate lobes of the ninth sternum. It is differentiated by having the lobes of the ninth tergum more acutely pointed at apices, rather than broad and truncate; by having the claspers rather triangular in shape and with a narrow lobe extending from posterior submedian margin of sternum alongside of each clasper and also by having the ninth sternum largely membranous in the central portion (Fig. 15*a*), not sclerotized. I misinterpreted the characteristics of the claspers and hind margin of the ninth sternum in the original description. After studying more completely cleared specimens a pair of submedian lobes have been found the stone rnum, these lie very close to the inner margins of the claspers and are easily overlooked (Fig. 15*b*). Also the lobes of the ninth tergum are subacute, not sharply pointed in the specimens at hand (Fig. 15*c*). For a more complete description refer to the original.

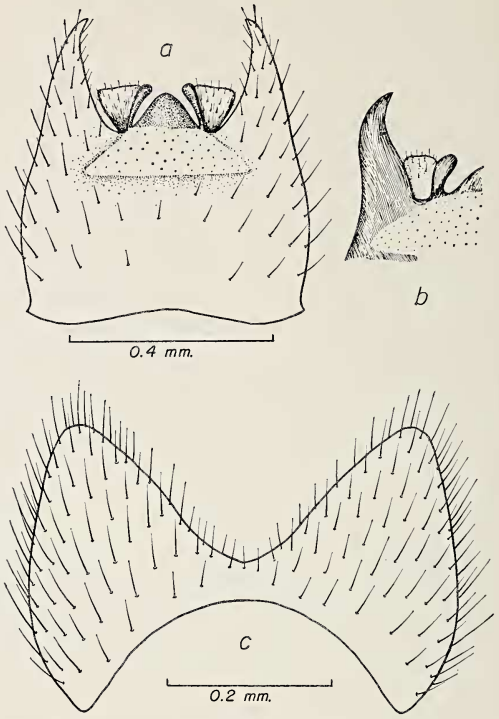

FIG. 15. *Plecia inconspicua* Hardy. *a*, Ninth sternum; *b*, ninth sternum, tilted to left showing submedian lobe; *c*, ninth tergum.

Length of type: Body, 3.0 mm.; wings, 3.75 mm.

TYPE LOCALITY: Kokoda, Papua.

Type in the British Museum (Natural History).

Specimens on hand from Wisselmeren, Waghete, Tigi L., New Guinea (Netherlands), 1700 m., Aug. 17, 1955 (J. L. Gressitt) are slightly larger than the type: body, 4.0–4.2 mm.; wings, 5.0–5.3 mm.

Plecia javensis Edwards

Plecia javensis Edwards, 1925, Treubia 6: 158.

A large species with the thorax all rufous and the wings brown to blackish fumose. It is

related to *P. thoracica* (Guérin) and is separated by the genital characters of the male. The claspers of *P. javensis* are produced into elongate slender lobes at their apices while the claspers of *thoracica* are blunt, rounded at apices not developed into an apical lobe. The aedeagus and its accessory structures, the ninth sternum, tergum, and cerci are also differently developed in the two species. In *javensis* the ninth tergum is two times wider than long and has a V-shaped cleft almost to its base on the hind margin. The posterior lateral margins of the tergum are each bilobed, the inner lobe is broader, more blunt than is the outer. The cerci are broad, well developed, and extend well beyond the apices of the tergum. The ninth sternum is very broadly concave on the hind margin, at the median portion the sclerite is less than half as long as at lateral margin; the posterior lateral margins are sharply pointed. The claspers are very irregular in shape, are extended into slender lobes on inner apices, and are apparently fused together by a narrow sclerotized bridge connecting their inner bases. The aedeagus has an elongate rodlike accessory structure on each side, extending beyond apices of claspers. (Refer to figs. 4a, b, Hardy, 1952, Beitr. z. Ent. 2: 430.)

Length: Body, 6.5–10.0 mm.; wings, 7.8–14.0 mm.

TYPE LOCALITY: Java.

Type in the British Museum (Natural History).

I have seen the type and numerous specimens from Java.

This is the species which Malloch (1928, Linn. Soc. N. S. Wales, Proc. 53: 604) determined as "*Plecia fulvicollis* Fab." The specimens were intercepted at San Francisco, "reared from orchids" (the medium in which they were growing) brought in from Java on the S. S. "Tenyo Maru."

Plecia laffooni Hardy

Plecia laffooni Hardy, 1950, Hawaii. Ent. Soc. Proc. 14: 80–82, fig. 6a–c.

A medium-sized species having the dorsum of the thorax bright orange and the pleura brown to black. It fits in a complex with *P. gurneyi* Hardy and *P. manni* Hardy because of the unusual development of the male genitalia: the fingerlike claspers, the paired lobes on each posterior lateral margin, and the strong, heavily sclerotized accessory structures of the aedeagus. *P. laffooni* is readily differentiated from *manni* by the presence of the elongate rodlike submedian lobes on the hind margin of the ninth sternum (*loc. cit.*, fig. 6a). It differs from *gurneyi* by the subequal lobes of the posterior lateral margins of the sternum, the dorsal lobe is about equal in size to the clasper and extends as far as apex of clasper, rather than being short, inconspicuous, not longer than dorsal lobe. Also the submedian lobes of the sternum extend well beyond apices of claspers and the claspers are smaller; the accessory structures of the aedeagus are also much stronger in *laffooni*, extending beyond apices of claspers. In *gurneyi* the claspers are larger and the accessory structures smaller, scarcely extending beyond hind margin of sternum. The ninth tergum of *laffooni* is also longer than wide and has a deep V-shaped cleft on hind margin (*loc. cit.*, fig. 6b). See original description for more complete details.

Length: Body, 4.2–5.0 mm.; wings, 5.8–6.6 mm.

TYPE LOCALITY: Guadalcanal, Solomon Islands.

Type in the U. S. National Museum.

Plecia lieftincki n.sp.
Fig. 16*a–c*

Related to *P. ruficornis* Edwards (from Kei Island, Indonesia) but distinguished by the characteristics of the male genitalia. In Edward's species the lobes of the posterior lateral margin of the ninth sternum are elongated and pointed, extending two times farther than the claspers. In *lieftincki* the lobes are rounded at their apices and extend scarcely two-thirds as long as the claspers (Fig. 16*a*). Also the

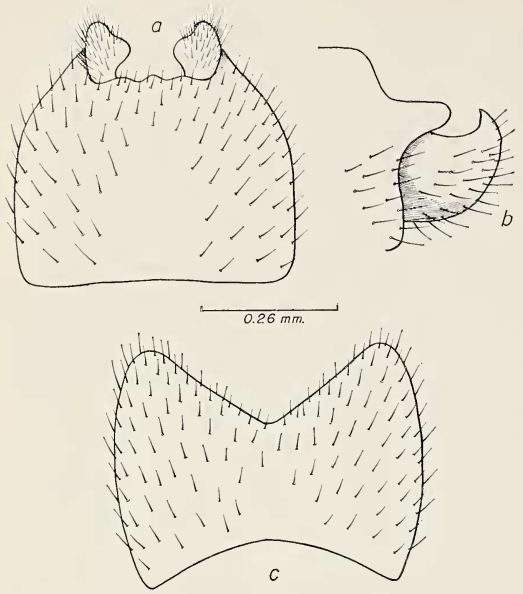

FIG. 16. *Plecia lieftincki* n. sp. *a*, Ninth sternum; *b*, clasper, lateral view; *c*, ninth tergum.

claspers are quite differently shaped in the two species.

MALE: A small species, belonging in the group which has the thorax entirely rufous. The halteres are brown, the bases are rufous. The scape and pedicel of the antenna are yellow-brown, the flagellum is brown. *Legs:* Entirely brown, all of the segments are moderately slender, not at all swollen. *Wings:* Faintly brown fumose, more distinctly so along the costa. Vein R_{2+3} straight, oblique in position forming about a 75° angle with R_{4+5}. *Abdomen:* Entirely dark brown. *Genitalia:* The ninth tergum is about two times as wide as long and has a moderate concavity extending nearly half its length on the posterior margin (Fig. 16*c*). The ninth sternum is slightly wider than long and fits the characters given above and in Figure 16*a*. The claspers are but little longer than wide, are rounded at apex, and produced into a protuberance on inner margin as viewed from below. In lateral view each clasper is seen to terminate in a sharp upward curved point (Fig. 16*b*).

Length: Body, 3.5 mm.; wings, 3.8 mm.

FEMALE: As in the male except for genital and secondary sexual characters. The flagellum of the antenna is 8-segmented (the tip is broken in the male).

Length: Body, 3.5 mm.; wings, 4.2 mm.

Holotype male and allotype female: Base Biak, 2-VIII-1952, op licht (L. D. Brongersma and W. J. Roosdorp).

Both have been returned to the Rijksmuseum van Natuurlijke Historie, Leiden, Holland.

I take pleasure in naming the species after my friend, Dr. M. A. Lieftinck, who has made such outstanding contributions in the field of entomology in Indonesia.

Plecia magnispina n. sp.
Fig. 17*a*, *b*

Related to *P. decora* Hardy but differentiated by its smaller size and by the differently developed genitalia. The lobes of the ninth tergum of the male are more strongly con-

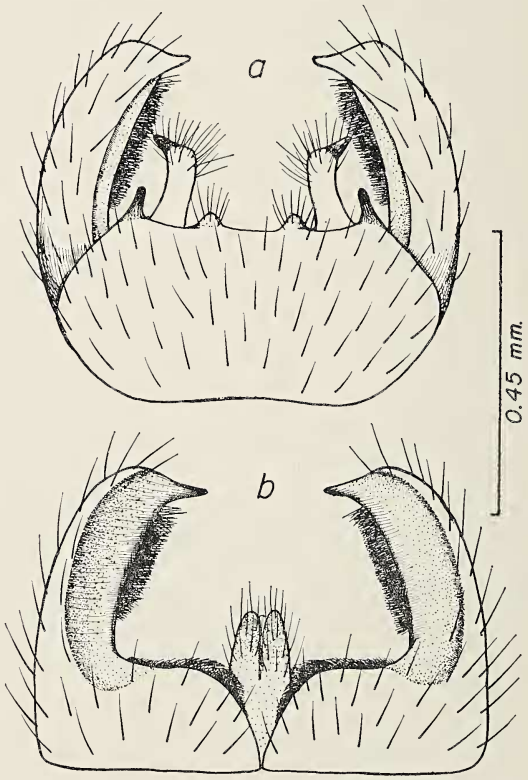

FIG. 17. *Plecia magnispina* n. sp. *a*, Genitalia, ventral view; *b*, ninth tergum.

vergent and terminate in a large apical spine, the claspers are more pointed apically, and the posterior lateral margins of the ninth sternum are developed into slender lobes (Fig. 17*a*).

MALE. *Head:* Black, including appendages. Antennae short, compact, apparently 9-segmented. Ocellar tubercle large and conspicuous. *Thorax:* Dull red with three reddish-brown to black vittae extending longitudinally down the mesonotum. Lower portion of pleura red, upper portion brownish red. Scutellum red with a black line through the middle. Halteres yellow-red, tinged with brown on their knobs. *Legs:* Coxae, trochanters, and bases of femora rufous, remainder brown tinged with rufous. *Wings:* As in *decora*, faintly fumose, vein R_{2+3} at about a 45° angle to R_{4+5}. *Abdomen* and *genitalia:* Dark brown to black. Ninth tergum with a narrow V-shaped cleft in middle of hind margin, extending nearly to base of segment; the posterior lateral margins are strongly lobate, sharp pointed at apices. The inner margins of tergum are very densely covered with short black hair (Fig. 17*b*). The ninth sternum is scarcely half as long as the tergum, is about two times wider than long, and has a sharp, slender spinelike lobe on each posterior lateral margin, also a small rounded knoblike lobe just inside each clasper. Claspers rather slender, four times longer than wide, shaped as in Figure 17*a*, as seen from a dorsal view. Each clasper with a sharp pointed lobe near base arising from dorsal surface, visible from lateral or end view. Aedeagus with a pair of rodlike accessory structures, these are slightly curved at apices.

Length: Body, 3.0 mm.; wings, 4.5 mm.

FEMALE: Fitting the above description in most respects. The front has a rather well-developed keel down the middle. The mesonotal vittae vary from brownish-red to black.

Length: Body, 3.5 mm.; wings, 5.5 mm.

Holotype male and allotype female, Wisselmeren, Obano, Dutch New Guinea, 1770 m., Aug. 9, 1955 (J. L. Gressitt). Twenty-five paratypes, 13 ♂♂ and 12 ♀♀ from following localities in New Guinea: same as type; Wisselmeren, Paniai, Sept.–Nov. 1949 (H. Boschma); Mt. Wilhelm, 3000 m., July 4, 1955 (J. L. Gressitt); Wisselmeren, Okaitadi, 1800 m., Aug. 7, 1955 (J. L. Gressitt); Daulo Pass, 2400 m., (Asaro-Chimbu div.) June 15, 1955 (J. L. Gressitt); and Mist Camp, 1800 m., 12-I-1939 (L. J. Toxopeus).

Type, allotype, and a series of paratypes returned to the Bernice P. Bishop Museum. Remainder of paratypes distributed among the following collections: Rijksmuseum v. Natuurlijke Historie, Leiden; U. S. National Museum; British Museum (Natural History); and the University of Hawaii.

Plecia malayaensis Hardy

Fig. 18*a*, *b*

Plecia malayaensis Hardy, 1948, Kans. Ent. Soc. Jour. 21: 36. New name for *Plecia minor* Edwards, 1928, Jour. Fed. Malay States Mus. 14: 44, *nec P. minor* Jaennicki, 1867, Senckenb. Naturf. Gesell. Abhandl. 4: 318.

Related to *P. inconspicua* Hardy, from Papua, but differentiated by the truncate lobes of the

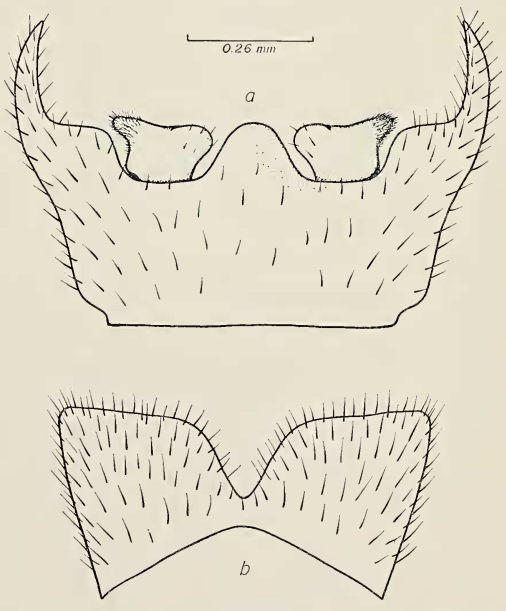

FIG. 18. *Plecia malayaensis* Hardy. *a*, Ninth sternum; *b*, ninth tergum.

ninth tergum of the male and by having the claspers pointed on the outer apices (Fig. 18*a*); rather than the lobes of the tergum being subacutely pointed, the claspers rather triangular, and a narrow lobe extending from the hind margin of the sternum along the inner side of each clasper (Fig. 15*a*).

A small species with rostrum not strongly produced and only about three-fourths as long as antennae. Antennae brown to black, 9-segmented in the male, 11-segmented in the female. Ocellar tubercle large and prominent. Mesonotum and scutellum (except for a black line down the latter) entirely opaque rufous. Pleura brown, tinged with rufous especially on sternopleura. Legs black in the male, tinged with rufous in the female. Front tibia rather strongly swollen, especially in the male, in the middle it is equal to slightly wider than the thickest part of the femur. Wings light brown fumose. Vein R_{2+3} bent near base, entering the costa at about a 65° angle to R_{4+5}. Petiole of cell M_2 not much longer than r-m cross vein. Cubital cell not at all narrowed at apex. Abdomen and genitalia dark brown to black. Ninth tergum with a V-shaped cleft in middle of hind margin, dividing the segment into two nearly quadrate lobes (Fig. 18*b*). The ninth sternum is rather strongly forcipate, the lobes on the posterior lateral margins are slender and sharply pointed. The posterior median margin of the sternum has a broad round-topped lobe extending approximately as far as apices of claspers. The claspers are short and broad, broadly rounded on inner apex, and with a subacute, densely setulose lobe on outer apex (Fig. 18*a*).

Length: Body, 4.5–5.0 mm.; wings, 5.0–6.4 mm.

TYPE LOCALITY: Mabek, Peninsular Siam.

Type in the British Museum (Natural History).

I have studied specimens in the British Museum collection from Biserat, Siam. The species probably occurs throughout Thailand and Malaya and possibly to the West through Burma and South India. Edwards recorded it from Methapalayam, S. India.

Plecia manni Hardy

Plecia manni Hardy, 1950, Hawaii. Ent. Soc. Proc. 14: 82–84, fig. 7a.

Related to *P. laffooni* Hardy and to *gurneyi* Hardy and fits the descriptions of these species except for male genital characters and except that the cubital vein is rather sharply bent downward and the cubital cell is narrower at the apex. The ninth sternum lacks the pair of slender rodlike submedian lobes which is characteristic of the other two species in this complex and the posterior median portion of the sternum is developed into a large semimembranous portion which is longer than the remainder of the segment and which extends two-thirds the length of the claspers. The aedeagus has a pair of strong, curved, and sharply pointed accessory structures which extend well beyond the apices of the claspers. For a complete description see the above reference and figure.

Length: Body, 5.0 mm.; wings, 5.7 mm.

TYPE LOCALITY: Fulakora, Solomon Islands.

Type in the Museum of Comparative Zoology.

Plecia mayoensis Hardy

Plecia mayoensis Hardy, 1950, Hawaii. Ent. Soc. Proc. 14: 84, fig. 8a, b.

Fitting in the complex which has the thorax entirely rufous and distinguished by the male genital characters. The slender stemmed, capitate lobes at the apex of the ninth sternum will separate it from all known species of *Plecia*. The apical lobes extend beyond the apices of the claspers and to the tip of the aedeagus. The claspers are short and broad, obtuse at apices. The ninth tergum has a deep U-shaped cleft on hind margin, the lobes are rounded at apices. For a more complete description and figures, refer to the above reference.

Length: Body, 9.0 mm.; wings, 8.5–9.5 mm.

TYPE LOCALITY: Mt. Mayo, Davao, Philippine Islands.

Type in the Museum of Comparative Zoology.

Plecia monticola n. sp.
Fig. 19*a–e*

An all black species (males) which along with *P. disjuncta* n. sp. is distinguished from other *Plecia* by the lateral expansion of the ninth tergum, which causes the genitalia to be wider than long in lateral view. Also the cleft of the tergum divides it into two plates connected only by a thin sclerotized line at their bases. *P. monticola* is separated from *disjuncta* by the slender pointed lobes at apex of the ninth sternum (Fig. 19*d*).

MALE. *Head:* Antenna black with a tinge of reddish brown on the pedicel and at base of first flagellar segment; composed of but six clearly defined segments, the apical portion evidently made of two closely joined segments (Fig. 19*a*). Rostrum about half as long as antennae. Ocellar tubercle prominent. *Thorax:* Opaque black, lightly gray pollinose; with a faint reddish tinge in the ground color of the humeral ridges, the areas to the sides of the scutellum, and the metanotum are sometimes yellow-brown. The halteres are brown with brownish-yellow stems. Three distinct longitudinal grooves are present on the mesonotum. *Legs:* Entirely black, the tibiae or tarsi not swollen. *Wings:* Dark brown fumose. Fork of R_s situated at the middle of the distance from base of R_s to apex of R_{4+5}, the first section of R_s is about half the length of the second. Vein R_{2+3} straight entering the costa at about an 80° angle to R_{4+5}. Cubital cell not narrowed at apex. *Abdomen* and *genitalia:* Subopaque black, rather sparsely pilose. Cleft of ninth tergum expanded in middle (Fig. 19*b*), on the inner side of each plate of the tergum is a set of strong curved bristles along the posterior inner margin; the anterior inner margin is densely covered with short, stout, black bristles, these are visible only from an inner view of the genitalia. From a lateral view (Fig. 19*c*), the tergum is greatly expanded around the side of the genitalia. The posterior lateral lobes of the ninth sternum are about equal in length to the remainder of the segment and about two times longer than the claspers as seen in ventral view (Fig. 19*d*). A small submedian lobe lies just inside each clasper and a broad moundlike gibbosity is present in middle of hind margin of the sternum. From an end view the claspers are rather elongate and attenuated and a heavily sclerotized comblike accessory structure is visible on each side of the aedeagus (Fig. 19*e*).

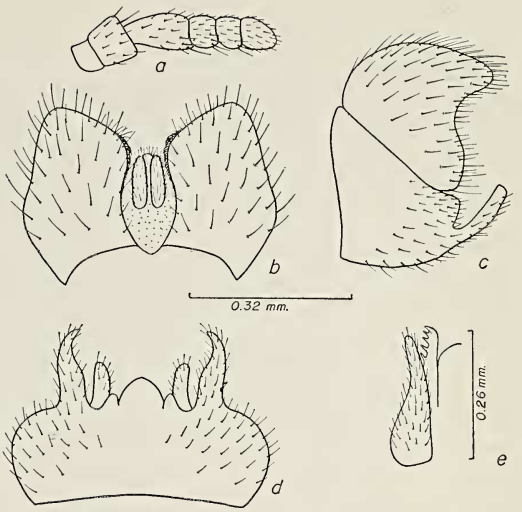

FIG. 19. *Plecia monticola* n. sp. *a*, Antenna; *b*, ninth sternum; *c*, genitalia, lateral view; *d*, ninth sternum; *e*, end view of claspers and accessory structures of aedeagus.

Length: Body, 3.0 mm.; wings, 4.0 mm.

FEMALE: Antennae 7-segmented. Humeral ridges, sternopleura, hypopleura, metanotum, and sides of mesonotum and scutellum tinged with rufous. Wings slightly paler fumose. Femora reddish brown on the attenuated portions. Otherwise as in male except for genital characters.

Length: Body, 3.3 mm.; wings, 5.0 mm.

Holotype male, allotype female, and two male paratypes, Mt. Wilhelm, N.E. New Guinea, 3000 m., July 4, 1955 (J. L. Gressitt).

Type and allotype in Bernice P. Bishop Museum. One paratype in the U. S. National Museum and one at the University of Hawaii.

Plecia morosa Edwards
Fig. 20*a*, *b*

Plecia tristis Edwards, 1927, Treubia 9: 362, fig. e, *nec P. tristis* van der Wulp, 1884, Notes Leyden Mus. 6: 251.
Plecia morosa Edwards, 1932, Treubia 14: 140.

A moderately small, opaque dark-brown to black species, readily recognized by the distinctive genitalia of the male. The lack of development of the posterior lateral lobes of the ninth sternum (Fig. 20*a*) and the strong development of the lobes of the tergum (Fig. 20*b*) will separate it from related species. Ninth sternum about two times wider than long, the posterior lateral margins are rounded and the posterior median portion is raised into a semimembranous mound. The claspers are capitate, rounded at apices, their bases seem to be fused with the margins of the sternum (Fig. 20*a*). The ninth tergum is deeply cleft almost to its base on the hind margin; the lateral lobes are rather slender (Fig. 20*b*) and extend nearly half the length of the segment beyond the claspers.

Length: Edwards measured the body and wings as 6.0 mm. The specimens I have seen measured 3.35–3.75 mm. for the body and 4.5–5.2 mm. for the wings.

TYPE LOCALITY: Tjibodas, W. Java.

Type in the British Museum (Natural History).

I have studied specimens from the type locality.

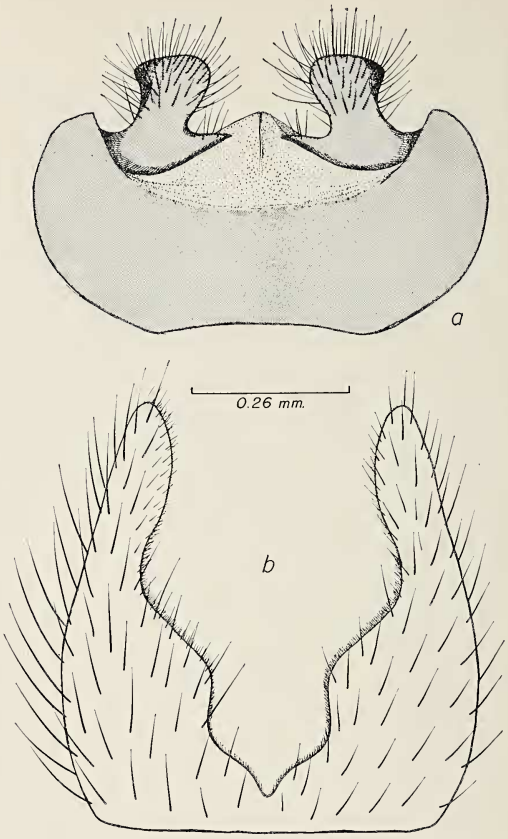

FIG. 20. *Plecia morosa* Edwards. *a*, Ninth tergum; *b*, ninth sternum.

Plecia ornaticornis Skuse
Fig. 21*a*, *b*

Plecia ornaticornis Skuse, 1899, Linn. Soc. N. S. Wales, Proc. (2)3: 1374.

A moderate sized species belonging in the complex which has the thorax entirely rufous. It appears most closely related to *P. ruficornis* Edwards but is larger and the male genitalia are differently developed. The lateral lobes of the ninth sternum are rounded rather than sharp pointed at their apices; the claspers are truncate, pointed on inner apices rather than rounded and a broad rounded median lobe is present on the hind margin of the sternum, also the lateral lobes are closer together as in Figure 21*a*.

MALE: Eyes very sparsely pilose. Antennae chiefly black, 9-segmented, the second segment slightly reddish on apical half. Legs black, segments slender. Wings light brown fumose, darker along costal margin. R_{2+3} straight or nearly so, forming about a 75° angle with R_{4+5}. Petiole of cell M_1 one-half longer than r-m cross vein. Cubital cell slightly narrowed at apex. Genitalia characterized by strong lateral lobes of ninth sternum and small claspers shaped as in Figure 21*a*. Ninth tergum nearly divided into two plates (Fig. 21*b*).

Length: Body, 5.0–6.0 mm.; wings, 6.0–7.0 mm.

TYPE LOCALITY: Cairns, Queensland.

Type in the Macleay Museum, Sydney.

I have seen specimens from Australia, in the British Museum, which had been determined by Dr. F. W. Edwards.

Plecia palauensis Hardy

Plecia palauensis Hardy, 1956, Insects of Micronesia Diptera: Bibionidae and Scatopsidae 12(2): 88, fig. 1a–d.

This is a dark-brown to black species but the genital characters show relationship to *P. javensis* Edwards (with the thorax entirely rufous). As in *javensis* the claspers are joined by a narrow sclerotized bridge, the ninth sternum is very broad, the median portion of the sternum is narrow, and the posterior lateral margins are acutely pointed (fig. 4, Hardy, 1952, Beitr. z. Ent. 2(4–5): 431). It differs from *javensis* and from other known *Plecia* by the details of the male genitalia (as shown in Hardy, 1956, *loc. cit.*, fig. 1c, d) and as described below; by the dark coloration; by the 6-segmented flagellum of the male antenna (rather than 8); also by the normally developed ocellar triangle, not greatly reduced as in *javensis*.

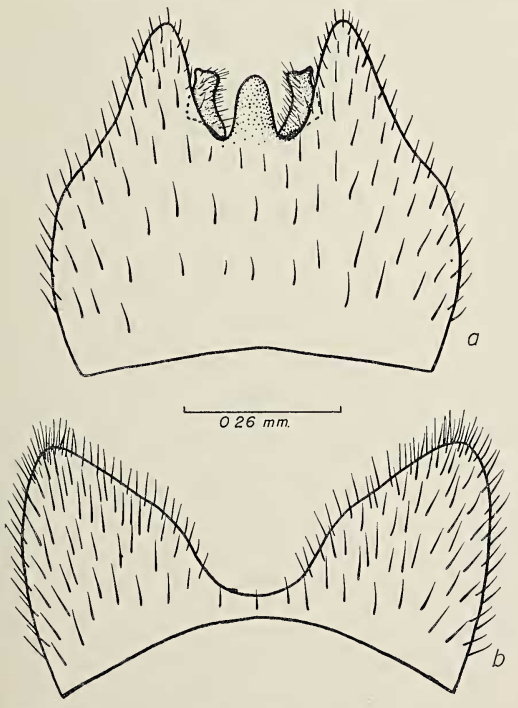

FIG. 21. *Plecia ornaticornis* Skuse. *a*, Ninth sternum; *b*, ninth tergum.

MALE: Predominantly opaque brown to black, bases of halteres yellow. A moderately deep furrow is present down each dorsocentral line and a faint indication of a median furrow is present on the anterior half of the mesonotum. The wings are evenly fumose and vein R_{2+3} is almost vertical in position. The ninth tergum is deeply cleft, almost to its base, on the hind margin; the lateral lobes are gradually tapered and obtuse at apices (*loc. cit.*, fig. 1c). The posterior lateral margin of the ninth sternum is produced into rather elongate, slender lobes which extend beyond the apices of the claspers; through the median portion the sternum is very narrow, measured longitudinally it is less than half as long as a clasper. The claspers are simple, obtuse at apices, with a partially developed secondary lobe on the lateral margins, and with a narrow sclerotized bridge connecting them on their inner anterior margins (*loc. cit.*, fig. 1d). For further details refer to the original.

Length: Body, 3.0–3.8 mm.; wings, 3.8–4.5 mm.

Female unknown.

TYPE LOCALITY: Garakayo Is., Palau Islands. It is known only from the Palau Islands, Eastern Caroline Islands.

Type in the Bernice P. Bishop Museum.

Plecia parva Malloch

Fig. 22*a–c*

Plecia parva Malloch, 1928, Linn. Soc. N. S. Wales, Proc. 53: 606.

A rather small species in the group of species which have the mesonotum chiefly rufous and the pleura brown to black. It is distinguished from all other known species of *Plecia* by the peculiar development of the male

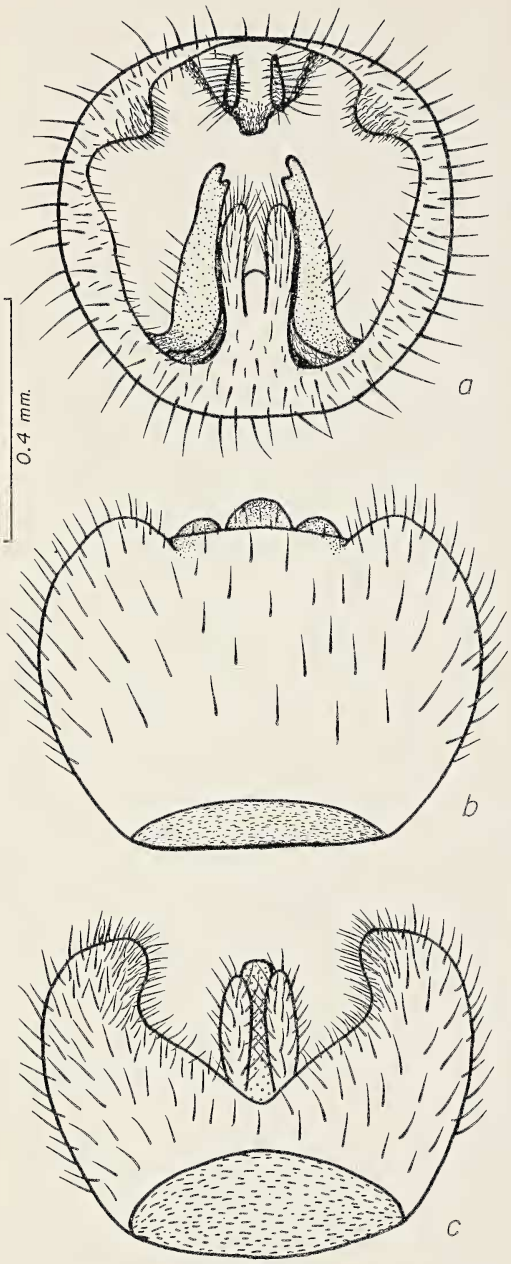

FIG. 22. *Plecia parva* Malloch. *a*, Genitalia, end view; *b*, ninth sternum; *c*, ninth tergum.

genitalia. The ninth segment is fused into a ring which forms a capsule surrounding the genitalia (Fig. 22*a*).

Malloch placed this in the *fulvicollis* complex but the specimens I have seen have the pleura brown to black, the front half of the mesonotum is discolored with brown to black with the hind portion rufous, also the scutellum is rufous. In the female the front of the mesonotum is not so extensively darkened. The antennae are broken on the specimens at hand, Malloch said the antennae are 8-segmented, exclusive of the minute tip. Legs stouter than usual, femora moderately swollen, tibiae almost parallel sided. Wings pale brown. Vein R_{2+3} slightly curved, forming a 65° angle with R_{4+5}. Petiole of cell M_1 not quite one-half longer than r-m cross vein. Cell Cu not narrowed. The ninth tergum and sternum are fused on the sides and form a capsule around the internal genital structures. The claspers and the shape of the hind margin of the sternum cannot be seen clearly except in end view (Fig. 22*a*). From a ventral view only, the bases of the claspers are visible (Fig. 22*b*). The tergum is moderately cleft on the hind margin (Fig. 22*c*).

Length: Body, 4.0–4.5 mm.; wings, 5.0–5.5 mm.

TYPE LOCALITY: Los Banos, Philippine Islands.

Type in the U. S. National Museum.

I have studied specimens from Luzon, P. I.

Plecia ruficornis Edwards
Fig. 23

Plecia ruficornis Edwards, 1927, Treubia 9: 363.

This species is known only from the type male and its exact position is not clearly understood. Edwards' description was very brief and his drawing of the genitalia is not entirely clear. It is indicated that the lobes on the posterior lateral margins of the sternum are slender, sharply pointed and widely spaced, that a broad rounded median lobe and a pair of small submedian lobes are also present on the hind margin of the sternum (Fig. 23). The ninth tergum has a deep U-shaped cleft on the hind margin, the lobes are subacute at apices.

This fits in the *fulvicollis* complex by having the thorax entirely rufous. It apparently is

closest related to *P. ornaticornis* Skuse, from Australia, but is differentiated by the pointed widely separated lateral lobes of the sternum, the presence of the submedian lobes, and by the rounded claspers.

Length: Body and wings, 4.0 mm.

TYPE LOCALITY: Kei Island.

Type in the British Museum (Natural History).

Figure 23 of the ventral aspects of the genitalia is reproduced from a sketch made of the type by Mr. Paul Freeman of the British Museum.

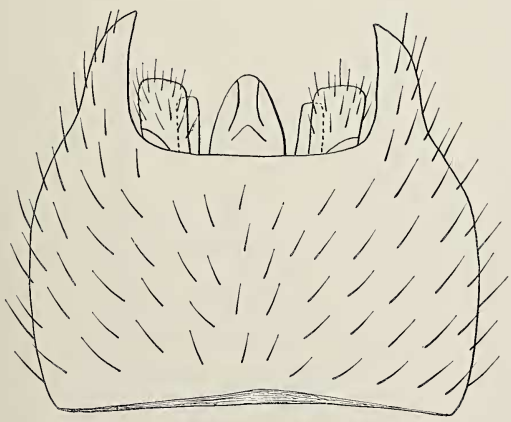

FIG. 23. *Plecia ruficornis* Edwards. Ninth sternum from sketch by Paul Freeman.

Plecia rufilatera Edwards
Fig. 24

Plecia rufilatera Edwards, 1927, Spolia Zeylanica 14: 119, fig. 1.

A chiefly black species characterized by having the sides of the mesonotum dull red and the scutellum reddish with a dark median line. Legs and abdomen all black. Wings brown, stigma darker than the remainder of membrane. R_{2+3} nearly straight and nearly vertical. Costa extending almost halfway from tip of R_{4+5} to M_{1+2}. Halteres black. Genitalia as shown in Figure 24, copied from Edwards. "Ninth tergite deeply emarginate, lobes strongly produced; sides of sternite also greatly produced; claspers minute."

FIG. 24. *Plecia rufilatera* Edwards. Genitalia, dorsal view, copied from original.

Wing length: 6.5–7.5 mm.

TYPE LOCALITY: Nuwara Eliya, Ceylon.

Type in British Museum (Natural History). Known only from the type and allotype.

Plecia siamensis Hardy

Plecia siamensis Hardy, 1951, Rec. Indian Mus. 50: 100, figs. a, b.

A moderate sized species of the *fulvicollis* complex (thorax entirely rufous) and distinguished by the very characteristic male genitalia. It fits closest to *P. subvarians* Walker, from Indonesia, but the ninth tergum is small compared to the sternum and the cleft on the hind margin of the tergum is narrow, its width is only one-fifth to one-sixth that of the segment. The ninth sternum has slender, curved, acuminate lateral lobes and rather broad rounded submedian lobes; the latter separated by a U-shaped cleft extending about one-third the length of the segment, measured in line with the submedian lobes. The claspers are obtuse at apices. See original for a more complete description and figures.

Length: Body and wings, 6.0 mm.

TYPE LOCALITY: Koh Chang Is., Siam.

Type in the British Museum (Natural History).

Plecia subvarians Walker
Fig. 25*a*, *b*

Plecia subvarians Walker, 1857, Linn. Soc. London, Proc. 1: 105.

This species fits in the *fulvicollis* complex by having the thorax entirely opaque orange to rufous. It is closest related to *P. siamensis* Hardy and is distinguished by the male genital characters. The ninth tergum is much stronger and extends to or beyond the apices of the sternum and the cleft in the middle of the hind margin of the tergum is broadly V-shaped and about one-third as wide as the segment (Fig. 25*a*). The submedian lobes on the hind margin of the sternum are pointed on the inner side just below the apices and are separated by a cleft which is sometimes expanded at the bottom (Fig. 25*b*). In *siamensis* the median cleft on the ninth tergum is rather narrow, the submedian lobes of the sternum are rounded and are separated by a U-shaped cleft. The posterior lateral lobes of sternum are slender, very slightly curved and the claspers are broad and blunt.

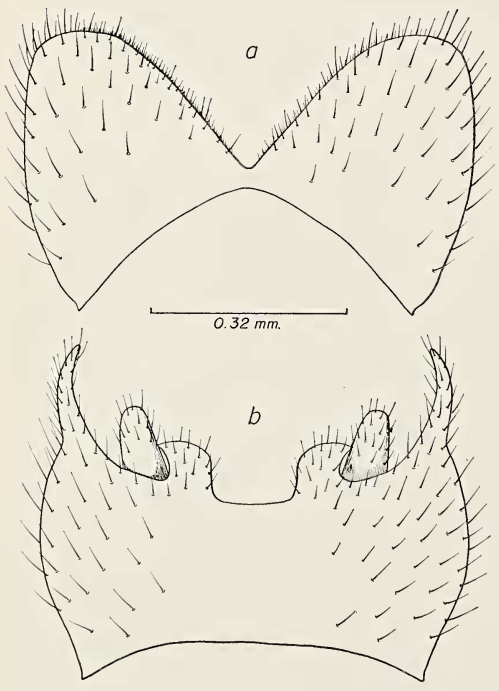

FIG. 25. *Plecia subvarians* Walker. *a*, Ninth tergum; *b*, ninth sternum.

The male antennae possess 9 segments and the female 11. The wings are light brown fumose, darker along the costal margin. Vein R_{2+3} is bent rather sharply at base and enters the costa at about a 55° angle to vein R_{4+5}. The petiole of cell M_1 is one-half longer than the r-m cross vein. Vein Cu_1 is bent sharply downward near the apex, the apical portion of the cubital cell is about equal to the length of the m-cu cross vein.

Length: Body, 5.5–6.0 mm.; wings, 6.5–7.0 mm.

TYPE LOCALITY: Sarawak, Borneo.

Type in the British Museum (Natural History).

It has been recorded from Sumatra, Java, Ceram, and Singapore. Brunetti (1912, Fauna of Brit. India, Diptera Nematocera, p. 163) recorded *subvarians* from India as a synonym of *P. fulvicollis* (Fabricius), this is an error. I have seen the type and other specimens from Borneo.

Plecia sundaensis Hardy

Plecia sundaensis Hardy, 1952, Beitr. z. Ent. 2(4–5): 432–434, fig. 5a, b.

This species is related to *P. subvarians* Walker and to *P. siamensis* Hardy because of the development of the male genitalia. It is readily differentiated by the very deep, broad cleft on the hind margin and by the sharp pointed lateral lobes of the ninth tergum (*loc. cit.*, fig. 5a); by the more evenly tapered, sharp pointed lateral lobes and by the more slender submedian lobes of the ninth sternum (*loc. cit.*, fig. 5b). Also the hypopleura of *sundaensis* are brown to black and a small brown spot is present on the upper portion of each mesopleuron; rather than the pleura be-

ing entirely rufous. The ninth tergum is cleft nearly to its base by a broad U-shaped concavity on the hind margin; the cleft is broader than each of the lateral lobes. The claspers are about two times longer than wide and are gradually tapered to a subacute apex.

For a more complete description and figures refer to the original.

Length: Body, 5.5 mm.; wings, 7.0 mm.

TYPE LOCALITY: West Flores, Lesser Sunda Islands.

Type in the Deutsches Entomologisches Institut, Berlin.

Plecia tenebrosa n. sp.
Fig. 26*a*, *b*

Related to *P. erebea* Skuse, from Australia, but the male genitalia are very different, as shown in Figures 26*a* and 10*a*.

MALE: A moderately large predominantly dull-black species. *Head:* Antenna reddish brown, with only seven distinct segments, the last two are closely joined. Mouth parts rather elongate, their length is about equal to the height of the head. Ocellar tubercle large, prominent. *Thorax:* Largely black humeri rufous, pleura and metanotum tinged with rufous in the ground color. Knobs of halteres black, stems brownish red. *Legs:* Dark brown to black, tinged with red; densely black haired. Segments slender. *Wings:* Light brown fumose, stigma slightly darker than the remainder of membrane. Vein R_{2+3} slightly curved, nearly vertical and almost meeting tip of R_1 at wing margin. The costa extends about one-third the distance between the tips of veins R_{4+5} and M_{1+2}. *Abdomen* and *genitalia:* Dark brown to black, all pile black. The ninth tergum is rather gently concave on hind margin, the concavity extending only about one-third the length of the segment (Fig. 26*b*). The ninth sternum is slightly wider than long, the posterior lateral margins are rounded and are produced just a short distance beyond bases of claspers; the posterior median margin has a rather sharply pointed lobe. The claspers are rather large, simple, pointed at apices (Fig. 26*a*).

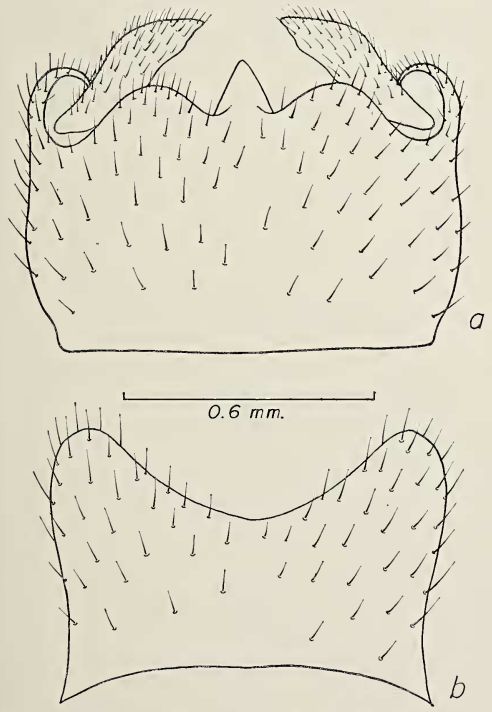

FIG. 26. *Plecia tenebrosa* n. sp. *a*, Ninth sternum; *b*, ninth tergum.

Length: Body, 8.0 mm.; wings, 8.7 mm.

Female unknown.

Holotype male and three paratypes "Java coll. Winthem." In the Naturhistorisches Museum, Wien under the name "*fulvicollis*."

Type and one paratype returned to Vienna. One paratype in the Bernice P. Bishop Museum and one in the University of Hawaii collection.

Plecia tergorata Rondani
Fig. 27*a–c*

Plecia tergorata Rondani, 1875, Ann. del Mus. Civ. di Storia Nat. di Genova 8: 462.

Plecia karnyi Edwards, 1927, Treubia 9: 363, fig. 3a, b. New synonymy.

Edwards' figure 3b of *P. karnyi* would seem to differ from *tergorata* by not having the claspers of the male joined and by the claspers being

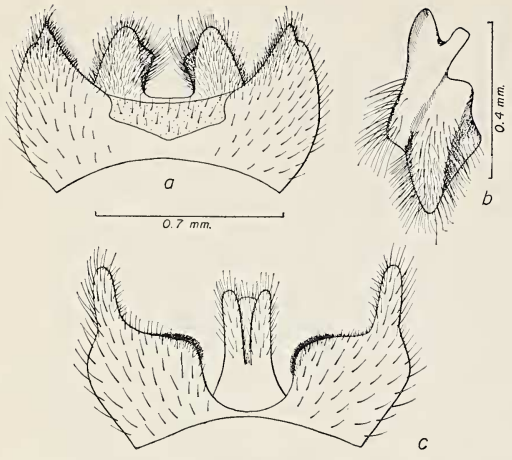

FIG. 27. *Plecia tergorata* Rondani. *a*, Ninth sternum; *b*, right clasper, end view; *c*, ninth tergum.

more slender and pointed as seen from a ventral view. I have studied in detail a specimen from W. Java which compared with Edwards' type in all respects. The claspers are joined and the difference in shape seems to be due to orientation. I see no way to distinguish these.

Plecia tergorata has not been recognizable from the literature. Brunetti (1912, Fauna of British India, Diptera Nematocera, pp. 164, 165) obviously was wrong in recording (redescribing) it from India. Speaking of the specimens before him from northern India, he said "there can be no doubt of their identity with this species." His assumptions, however, were based entirely upon color and antennal characters and his conclusions would have applied just as well to more than a dozen other species.

This fits in the complex which has the mesonotum rufous and the pleura brown to black. The male genitalia show relationship to *P. javensis* Edwards (*fulvicollis* complex) by having the claspers joined at bases; the structures are, however, quite differently developed, the claspers lack the long apical lobe and the rod-shaped accessory structures at sides of the aedeagus are also lacking.

Male antennae almost entirely dark brown to black, tinged with yellow on the scape and pedicel; 9-segmented with the apical 2 rather closely fused. Ocellar tubercle prominent. Mesonotum and scutellum all rufous except for a tinge of brown on the front portion of the former. Pleura entirely brown to black. Halteres brownish yellow. Legs brown, tinged with rufous in the ground color of the femora. Tibiae and tarsi nearly straight sided, not swollen. Wings brown fumose, vein R_{2+3} oblique, entering the costa at about a 60° angle to R_{4+5}. The ninth sternum is about two times broader than long, acutely pointed at posterior lateral margins, and largely membranous on the posterior median portion. The claspers extend as far as apices of sternum, are joined at bases by a narrow sclerotized bridge; the apices are rounded and a subacute point is present on inner margin, as seen from dorsal view (Fig. 27*a*). From an end view the clasper is bilobed at apex, with a rounded apical lobe and a narrower, truncate subapical lobe on outside margin (Fig. 27*b*). The ninth tergum is two times broader than long, deeply cleft on the hind margin, and with the posterior lateral margins developed into slender lobes, rounded at apices (Fig. 27*c*).

Length: Body and wings (male), 5.5–6.0 mm.

TYPE LOCALITY: Borneo.

Type in the Museo Civico di Storia Naturale, Genova, Italy.

I have studied the type female and the series of 2 ♀ ♀ and 3 ♂ ♂ labeled "Giava Teibodas (this may possibly be spelled Tejbodas), Ott 1872, O. Beccari." They were evidently the specimens studied by Rondani and are probably paratypes. The details of the genitalia given above and the figures are based upon one of these males, kindly loaned to me by Dr. Delfa Guiglia of the Museo Civico di Storia Naturale, Genova. Edwards (1931, Tijdschr. v. Ent. 74: 279) recorded it from Sumatra and said it was much like *karnyi* Edwards. I have also seen specimens from Brastagi, Calgdris, Sumatra, Aug. 1924, in the British Museum (Natural History).

Plecia tjibodensis Edwards

Plecia tjibodensis Edwards, 1927, Treubia 9: 363, fig. c.

A moderately small species belonging in the group of species which have the thorax rufous above and brown to black on the pleura. It seems most closely related to *P. tergorata* Rondani and *dubia* Edwards and is distinguished by having a rather shallow cleft on the hind margin of the ninth tergum, extending about one-third the length of the segment; rather than the cleft extending nearly to its base. Also the claspers terminate in a slight point at their outer apices. From Edwards' figure it appears that the sternum is about three times wider than long, the posterior lateral margins are rounded and there is apparently no median lobe on hind margin. It appears that the aedeagus is rather well developed, extending nearly to apex of sternum and has a small accessory structure on each side. Refer to *loc. cit.*, figure c.

Length: Body, 3.5–4.0 mm.; wings, 5.0 mm.

TYPE LOCALITY: Tjibodas, Java.

Type in the British Museum (Natural History).

I have not studied specimens of this species.

Plecia tridens n. sp.

Fig. 28*a*, *b*

Fitting in the complex of species which have the thorax all rufous but with strikingly different genitalia from any of the known species (Fig. 28*a*, *b*).

MALE. *Head:* Antennae brown, tinged with rufous on the basal segments; 9-segmented. Ocellar triangle well developed. *Thorax:* Entirely opaque yellow-red except for a faint black streak at tip of scutellum. Stems of halteres yellow, knobs brown. *Legs:* Brown to black, tinged with rufous on the coxae and bases of femora; segments slender. *Wings:* Faintly brownish or yellowish fumose, darker along costal margin. Vein R_{2+3} at about a 75° angle to R_{4+5}. *Abdomen* and *genitalia:* Entirely dark brown to black. Ninth tergum cleft nearly to its base on the hind margin (Fig. 28*a*). Ninth sternum with a large, heavily sclerotized, three-pronged projection from the middle of the hind margin. Claspers large, heavily sclerotized, each with an acute subapical point, a well-developed basal lobe on inner margin, and lying directly behind the projected portion of the sternum (Fig. 28*b*).

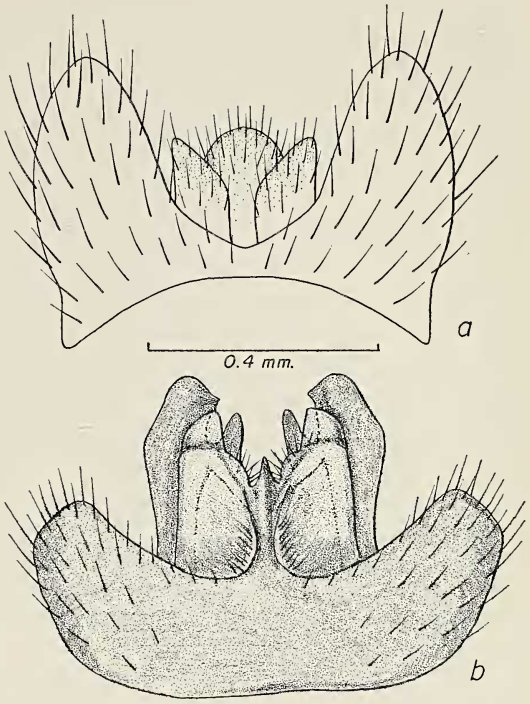

FIG. 28. *Plecia tridens* n. sp. *a*, Ninth tergum; *b*, ninth sternum.

Length: Body, 4.0 mm.; wings, 4.4 mm.

Female unknown.

Holotype male, Ins. Wetter, Netherlands Indies, Acq., 1896 (C. Schädler).

Type returned to the Rijksmuseum van Natuurlijke Historie, Leiden.

Plecia tristis van der Wulp

Fig. 29*a–c*

Plecia tristis van der Wulp, 1884, Notes Leyden Mus. 6: 251.

One male in the Rijksmuseum van Natuurlijke Historie, Leiden, from Java appears to be this species. It is a small, all-black species dis-

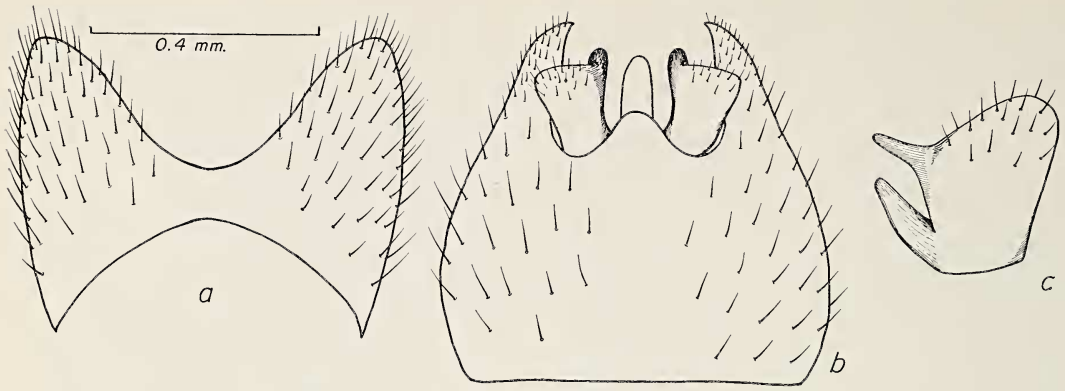

FIG. 29. *Plecia tristis* van der Wulp. *a*, Ninth tergum; *b*, ninth sternum; *c*, inner lateral view of right clasper.

tinguished from other *Plecia* by the male genital characters. The thorax is grayish on pleura and margins of mesonotum, also down the furrows; the areas marked off by the furrows are faintly subshining black. The wings are faint yellow-brown fumose. Vein R_{2+3} is straight and oblique and forms about a 45° angle with vein R_{4+5}. The ninth tergum is deeply concave on the hind margin and the lateral lobes are well developed (Fig. 29*a*). The ninth sternum has a long fingerlike projection from the posterior median margin extending nearly to apices of claspers. The posterior lateral margins of the sternum are developed into a pair of sharp pointed lobes which extend beyond the claspers (Fig. 29*b*). From a direct ventral view the clasper appears blunt and rounded at the apex. As seen from a lateral view (Fig. 29*c*) a pair of dorsally projected lobes are developed.

Length: Body, 4.0 mm.; wings, 5.0 mm.

I have studied one specimen from Goenceng Cedah, Java, Mar. 1911 (Leiden Mus.).

TYPE LOCALITY: Mount Ardjoeno, East Java.

The type is supposed to be in the Rijksmuseum van Natuurlijke Historie, Leiden, Holland, but I was unable to find it when I visited the Museum in August 1954. None of van der Wulp's specimens seemed to be designated and I doubt that the type of *P. tristis* is still extant.

Plecia varians Edwards
Fig. 30*a*, *b*

Plecia varians Edwards, 1928, Jour. Fed. Malay States Mus. 14: 43.

The original description consists of only two lines saying that the species "closely resembles *P. subvarians*, differing only in the male hypopygium, especially in the shape of the claspers," plus a figure from a dorsal view. Edwards' figure is not clear, the claspers are not differentiated from the sternum. It is probable that Edwards mistook the curved lateral lobes of the sternum for claspers, the claspers themselves are not distinctive, but the lobes of the sternum will separate it from related species.

Antennae of male 9-segmented, including the nipplelike tip; the female antennae are 10-segmented. These are all black in the male and tinged with yellow on the first two segments in the female. The front of the female has a predominent orange colored tubercle and a moderately distinct ridge down the middle. Thorax entirely orange to rufous. Legs dark colored, segments all slender. Wings light brown fumose. Vein R_{2+3} straight, forming a 75° angle with R_{4+5}. Petiole of cell M_1 two times longer than r-m cross vein. Cubital cell just slightly narrowed in the male, more strongly narrowed in the female. Ninth tergum

of male two times wider than long with a broad U-shaped cleft in middle of hind margin (Fig. 30*a*). Ninth sternum wider than long with slender, inwardly curved lateral lobes and rather broad, rounded submedian lobes on hind margin, the latter separated by a basally expanded cleft. The claspers are two or more times longer than wide and are obtuse at apices (Fig. 30*b*).

Length: Body, 5.5–6.0 mm.; wings, 7.0–8.0 mm.

TYPE LOCALITY: Pahang, Malaya.

Type in the British Museum (Natural History).

I have studied the type series in the British Museum.

Plecia (Heteroplecia) visenda Hardy

Plecia (*Heteroplecia*) *visenda* Hardy, 1950, Hawaii. Ent. Soc. Proc. 14: 75–76, fig. 1a, b.

This is the subgenotype of *Heteroplecia* Hardy which is characterized from other *Plecia* by the absence of ocelli or an ocellar triangle; there are no indications of these structures in either sex, and the compound eyes of the male are joined on the front up to the hind margin of the head. The species can be recognized by the subgeneric characters; it is a large species which has the thorax all rufous but the male genitalia are very different from those of other *Plecia* known to me.

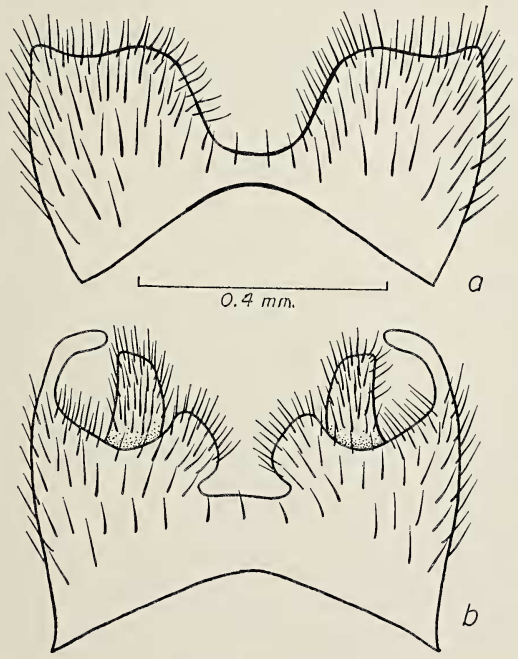

FIG. 30. *Plecia varians* Edwards. *a*, Ninth tergum; *b*, ninth sternum.

MALE. *Genitalia:* The tergum and the sternum are partly fused laterally on the dorsum. The tergum is developed into two large, sometimes divergent, lobes separated by a cordate shaped median cleft (*loc. cit.*, fig. 1a); the lobes are not usually so divergent as was figured, the genitalia of this specimen probably had been flattened. The ninth tergum extends about two times the length of the sternum. The ninth sternum is developed into a large rounded lobe on each posterior lateral margin, these extend nearly three-fourths the length of the clasper; the posterior median margin has a broad, irregular, submedian lobe just inside each clasper, these are separated by a small cleft which has a small median point at its base. The claspers are rather strong, extending well beyond lobes of sternum, and are sharp pointed at apices (*loc. cit.*, fig. 1b).

Length: Body, 9.5 mm.; wings, 11.0–12.0 mm.

The female has not been previously described. It fits the characteristics of the male except for sexual characters. The front is moderately broad, at its narrowest point it is about two-thirds as wide as one eye, measured from dorsal view; the front is subopaque, densely dark gray pubescent with a short keel in middle below, just above antennae and evenly rounded on the upper portion and vertex with no indication of ocelli or an ocellar triangle. The head is almost as high as long, the occiput is scarcely produced. Antennae brown, tinged with rufous especially on the basal segments; 12-segmented, counting the small tip portion. The palpi are elongated, they are one-third longer than the head or the antennae.

Length: Body, 10.0 mm.; wings, 12.0 mm.

TYPE LOCALITY: Mt. Eiori, Dutch New Guinea.

I have since seen a large series from Araucaria Camp, 800 m., Netherlands Indies-American New Guinea Exped., Mar. 1939 (L. J. Toxopeus).

Plecia zamboanga Hardy

Plecia zamboanga Hardy, 1950, Hawaii. Ent. Soc. Proc. 14: 84–85, figs. 9a, b.

A large species fitting in the *fulvicollis* complex because of the entirely opaque yellow to orange thorax. It is closest to *P. fulvicollis* (Fabricius) and is differentiated by the striking differences in the development of the ninth sternum of the male. The claspers are tiny and inconspicuous and are partially fused with the sternum. The broad, heavily sclerotized, median process on the hind margin of the sternum is truncate at apex, rather than being bilobed and the lobes of the posterior lateral margins are very differently developed (as shown in *loc. cit.*, fig. 9b). The ninth tergum is deeply cleft on the hind margin, the lobes are broadly rounded at apices (*loc. cit.*, fig. 9a).

Length: Body, 9.0–9.5 mm.; wings, 10.0–10.5 mm.

TYPE LOCALITY: Zamboanga, Mindanao, Philippine Islands.

Type in the Museum of Comparative Zoology.